



MOTOR AGE

CHILTON PUBLICATION

VOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

JULY
1938

IN THIS ISSUE



Death Spin

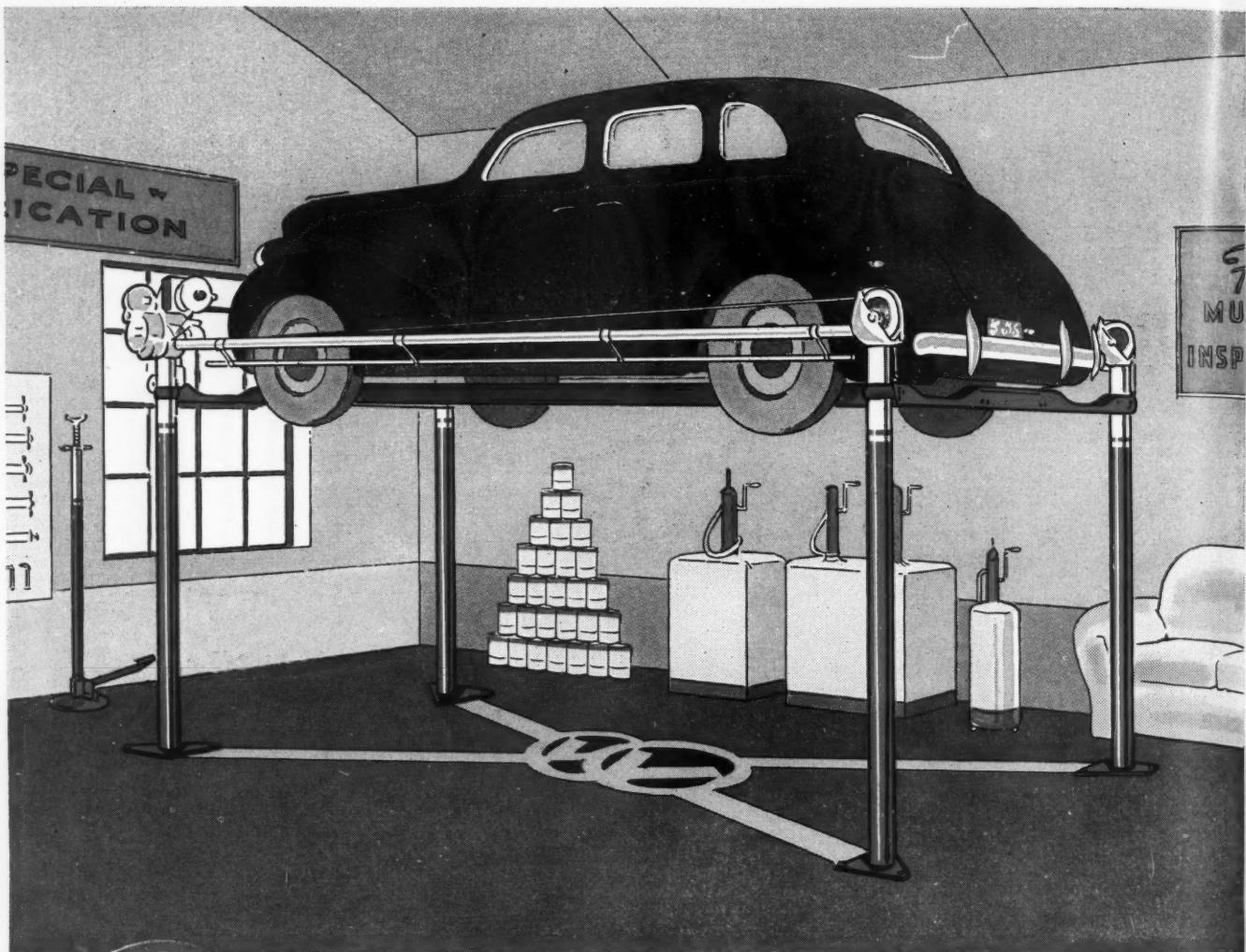
Death hung in the balance during the split second when Leonard "Buzz" Mendenhall fought desperately to gain control of his car after it crashed into the south turn wall of the Hammond, Ind., speedway. Death won and Mendenhall died after the car turned over three times coming to a halt right side up on the track.

Hudson Transmissions

Everything you'll want to know when disassembling and assembling these units. You'll save this article, it's so easy to follow.

Servicing Stromberg Carburetors

Step by step instructions with the story told in pictures. Another one you'll want to paste in your hat.



Now WALKER LIFTS in Color!

Now . . . in the Walker Lift . . . you get new life—new beauty—new sales appeal—at no extra cost.

Two beautiful new color combinations—rich blue and cream, or maroon and cream, in addition to the standard aluminum and red finish—are now available in any size and style Walker Electric Lift.

No longer need you rely on painted backgrounds to build up the appearance of your lube department. So colorful and striking are Walker Lifts that little background dress-up is needed.

Take advantage of this newest idea in Lift Showmanship to attract customers . . . to get more lubrication and maintenance business . . . to increase your profits.

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WALKER ELECTRIC LIFTS
in Color

LINCOLN LUBRICATING EQUIPMENT



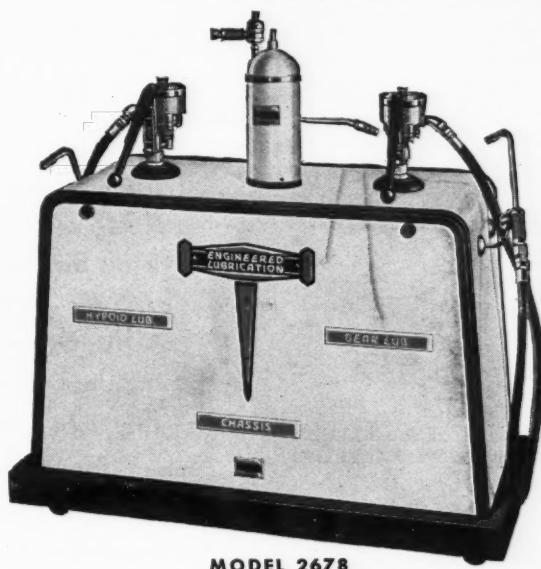
MODEL 981-C AIRLINE LUBRIGUN will dispense all types of chassis lubricant directly from original container. Air-operated full automatic pump is securely attached to the lid of a sturdy metal shell to fit over a standard 25-lb. container.



MODEL 591 GEAR LUBRICANT DISPENSER is a companion unit in appearance and size to the Airline Lubrigun, but operation is by hand instead of air. Quantity of lubricant dispensed is accurately indicated by a Lincoln Junior Meter.

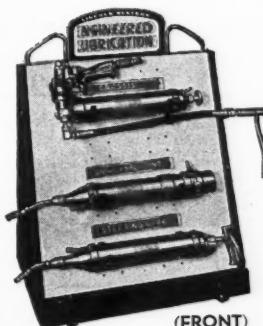
GUN CARRIAGE complete with LINCOLN LUBRIGUNS (illustrated at right) is one of many choices shown in Catalog No. 51 . . . Guns may be purchased individually or in selected combinations.

a complete line which includes modern dispensing units for dealers who purchase lubricants in 25 lb. CONTAINERS



MODEL 2678

JUNIOR STREAMLINERS are made in two models, one to accommodate three 25-lb. dispensing units, the other, two. **Model 2678**—incorporates an air-operated Lubrigun for Chassis lubricant and two Hand-Operated Gear Lubricant Dispensers. **Model 2679**—includes one air-operated Chassis Lubrigun and one Hand-Operated Gear Lubricant Dispenser.



(FRONT)



(REAR)

MODEL 694TT



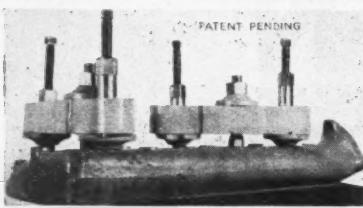
MODEL 586 SPRING REPACKER solves problem of pumping lubricants into metal covered springs. Is provided with hose of suitable length and Spring Clamp for attaching to spring cover. Pumping is done by hand.



MODEL 581 FILLER PUMP enables operator to fill specialized hand guns directly from original 25-lb. lubricant container—in quickest, cleanest, most convenient manner. Designed to handle Chassis, Universal Joint, and Fluid lubricants.

All these units and many others are illustrated and fully described in Catalog No. 51 . . . Ask your nearest Lincoln jobber, or write us for a copy.

LINCOLN ENGINEERING COMPANY
PIONEER BUILDERS OF LUBRICATING EQUIPMENT
GENERAL OFFICES, ST. LOUIS, MO. FACTORIES: ST. LOUIS, MO., DETROIT, MICH.



COMPLETE SET

\$9.85

Center bolt screws into spark plug hole to clamp unit to cylinder head. End bolts press down upon stud bolts in block, forcing head away from block to break natural seal.

NOW

A CYLINDER HEAD PULLER

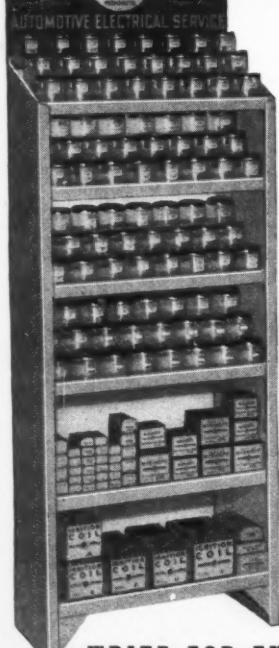
Meet the flood of summer motor tear-downs with the new Universal Cylinder Head Puller. Removes stubborn cylinder heads—especially aluminum, which tenaciously cling to the block—quickly and easily without damage to the head, stud bolts or block. Each unit has three adapters to fit standard spark plug holes. Puller works ideally either lengthwise or cross-wise of head. Complete set costs you less than replacement of one broken or damaged cylinder head. Satisfaction guaranteed—or your money back.

See your jobber or write us direct for full information.

The UNIVERSAL TOOL COMPANY
Chandler, Arizona

It's a fact!

PROFIT SALES
Every day



The SS-11 Service Stock, illustrated here, is the finest in ignition merchandising. It contains generous assortments of coils, brushes, rotors, contact points, and other electrical items so that the dealer can service over 90% of all cars, including latest models.

Cabinet is of sturdy steel construction, built to fit the dealer's individual business. Shelves may be interchanged or extra shelves may be added to meet the need for additional space. This cabinet cannot be outgrown.

Coils, condensers, distributor heads and other items are packed in neat, heavy stock cartons that will not crumble under weight.

Merchandise that is attractively displayed will step up any dealer's turn-over and bring more profit sales into his cash register every day.

WRITE FOR FULL PARTICULARS.

C. E. NIEHOFF & CO.
232 W. SUPERIOR ST., CHICAGO, ILL. U.S.A.

MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

Subscriptions for Motor Age are accepted only from independent repair shops and their employees.

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JULY 1938

SHOP TALK

Fireworks

Seems like all the fireworks this July weren't confined to the Glorious Fourth, for there's still plenty of sputtering and popping about the article, "Performance Requires Perfect Timing," which appeared in the March issue.

W. C. Condit, who hails from Bloomfield, N. J., and whose letter appeared in last month's MOTOR AGE, still maintains that the job can't be done. But, there are so many others who state, aver, assert, declare and swear that the timing method outlined in the article is 100 per cent O.K., that it certainly is a one-sided fight.

One thing you have to say for Condit—he's game; and, while greatly outnumbered, fights fair. In response to my accusation that he has condemned the method without trying, he went out, borrowed an electrical type tachometer (which will, of course, do a more accurate job than the speedometer), and checked a car—a 1937 Chevie. After setting the timing so as to get the maximum r.p.m. for a given setting of the throttle, he found that the job pinged badly. He also found that he got just as good acceleration (measured with a stopwatch) with regular gasoline as with ethyl. The timing as determined by the tachometer was 4 deg. ahead of the Chevrolet factory marks.

However, he only tried it on one job. And because the job pinged with that setting decided that the ping was due to the spark setting. My experience has shown that when a ping results, it is caused by some defect, probably faulty automatic advance or some local hot

spot, which might be caused by a clogged cooling system.

Better Batting Average

It is interesting to compare Condit's result with the results (note the singular and plural) by George Fich, of Hermosa Beach, Cal. George tried it on forty cars and found that it worked perfectly on 38, and on the two remaining got a bad ping. Henry Jennings, technical editor of the *Commercial Car Journal*, tried it on a fleet of twenty White trucks and got perfect results on eighteen. The other two required new springs in the distributor which, on being replaced, also gave perfect results.

Cal Crooks, of Springfield, Mass., has again entered the ring in defense of the method, and is ready to bet important money that he can tune engines by the speedometer or tachometer method and not have any ping. His letter is printed in

the "Clearing House" section of this issue.

Well, it's a great argument. Any more of you readers wishing to forsake the comfort and ease of a ringside seat for the excitement and turmoil of the ring, grab your pens and write me your opinions. It's a battle royal.

Trouble Shooter

Jim Parks, who has crashed this column on several occasions, stopped in to see me the other day. Jim, as you will recall, works in a Ford shop in Norton, Va., and is also preaching the gospel to the natives in the mountains. Some life! He has been shot at three times and poisoned once. Disarming the most belligerent of his congregation is a weekly occurrence. Thanks, I'll stick to editing.

Bid Tobac

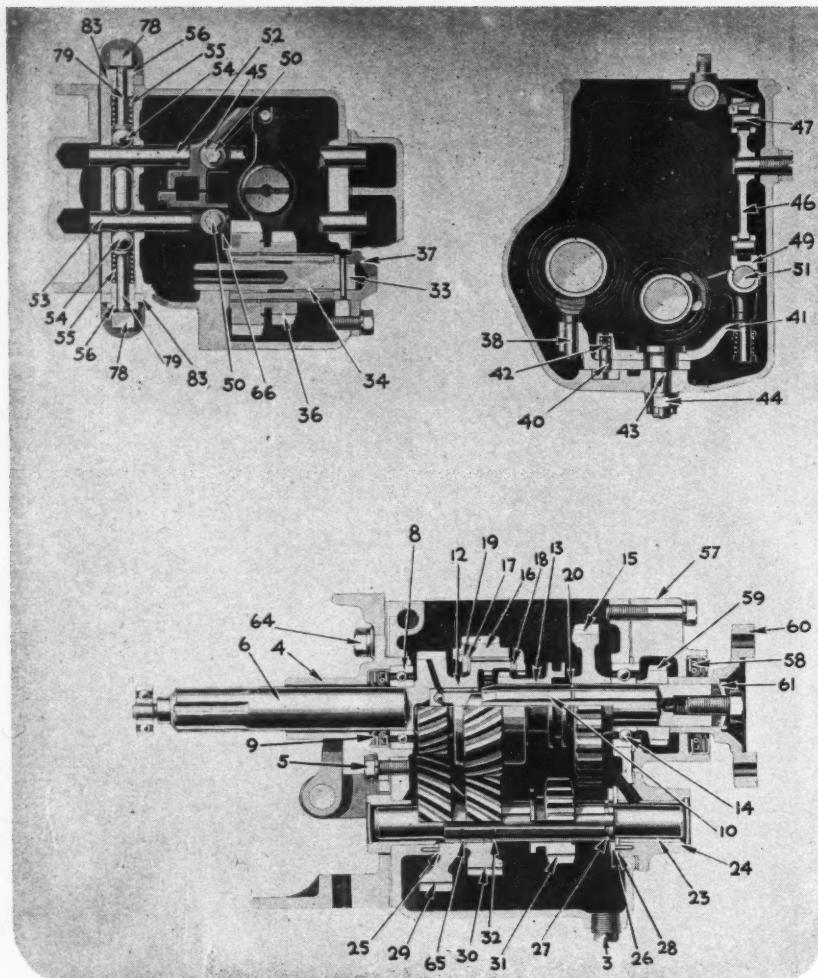


Fig. 1

OVERHAULING the transmission on 1934 to 1938 Hudson cars can easily be accomplished in 5.5 hours when the unit is not equipped with an Electric Hand. When it is equipped with an Electric Hand the job requires 6.2 hours, according to the Hudson Flat Rate manual. To accomplish the job in the allotted time it is necessary to use the following procedure:

Upon removal of the transmission from the chassis, the cap

screws holding the transmission cover to the case are taken out and the hand control lever and cover removed as an assembly. Then drain the transmission and thoroughly clean the inside of the case and gears.

Remove the hex nut from the bottom of the connecting link of the high and intermediate and low and reverse shift rail locking device and take off links 78 and lock rail rods. Remove six bolts 64 holding clutch housing to trans-

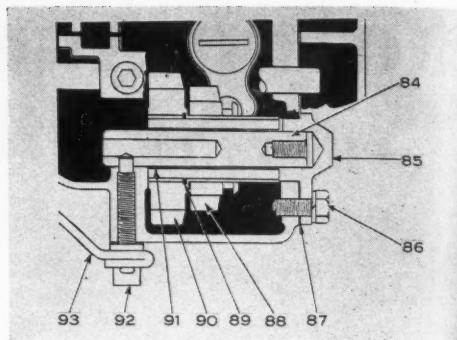


Fig. 2

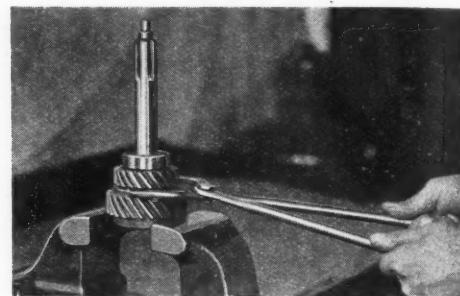


Fig. 5

Hudson

mission and take off clutch housing assembly. Remove cap screw from rear end of main shaft and take off front universal joint companion flange, using a puller as shown in Fig. 3. Remove three cap screws holding speedometer gear housing to transmission case and take off housing 57 and speedometer drive gear 59.

Remove low and reverse and high and intermediate lock ball spring caps 56, lock springs 55, lock balls 54, lock plungers 79 and

Fig. 14

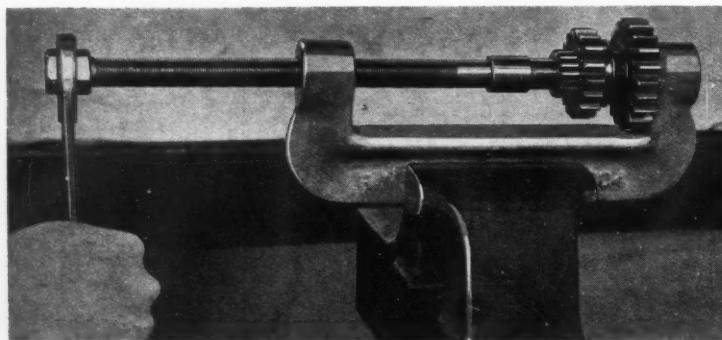


Fig. 13

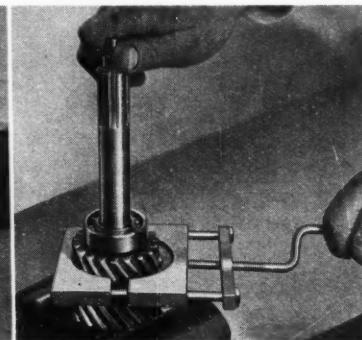
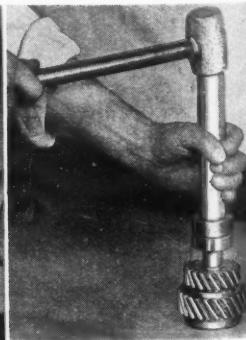


Fig. 12



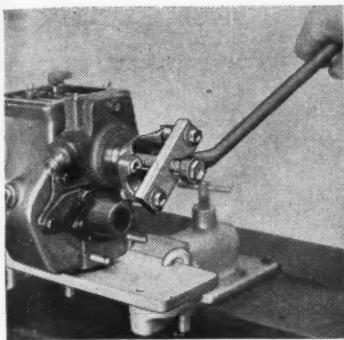


Fig. 3

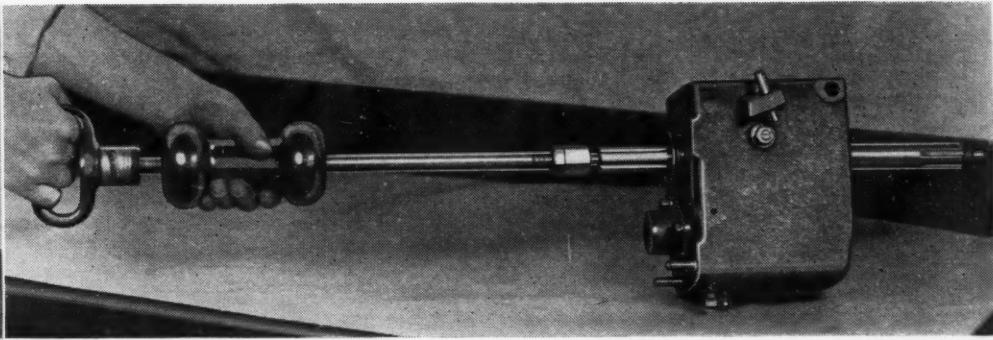


Fig. 4

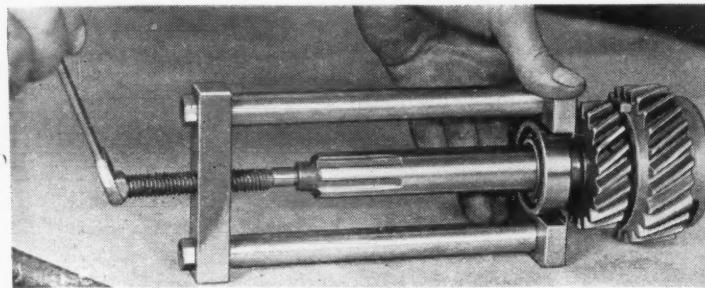


Fig. 6

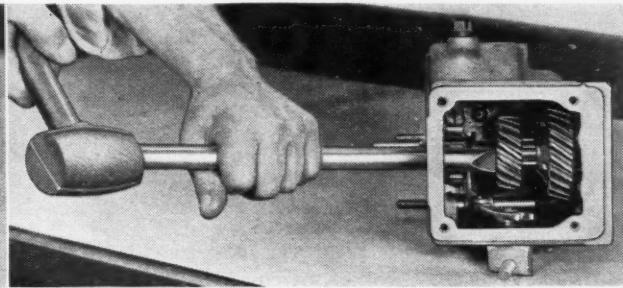


Fig. 7

Fig. 8

Transmissions

Here's all the details on servicing these units

shift rail lock rod guides 83. Take out low and reverse and high and intermediate shifter lock screws 50 and remove shift rails 52 and 53 and shifter forks.

Remove three cap screws 5 securing main drive gear bearing retainer to transmission case and take out retainer 4, tapping with a soft hammer if necessary. To remove main shaft 10 and drive gear assembly 6, drive main shaft low and reverse gear 15 backwards on main shaft far enough to remove

split lock ring 20, using a special transmission gear drift.

Pull main shaft and rear bearing out of transmission case by means of special adapter screwed into end of main shaft, Fig. 4. Remove main shaft low and reverse gear 15 and second and high shift sleeve 13 from transmission case. Remove mainshaft drive gear assembly 6 by lifting through top.

(Continued on page 36)

Fig. 11

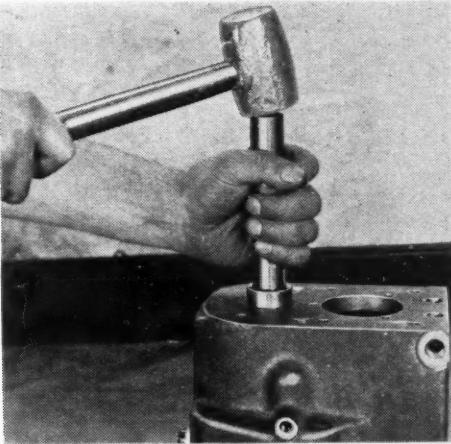
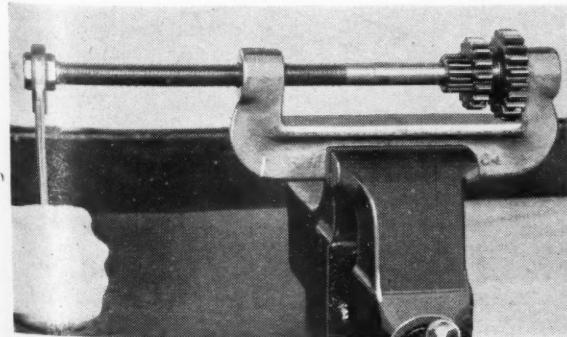


Fig. 9

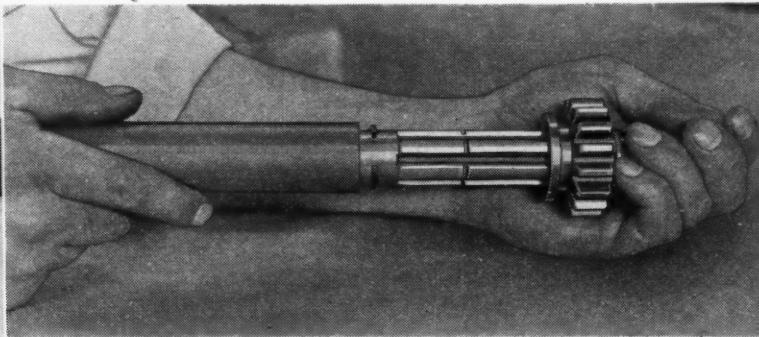
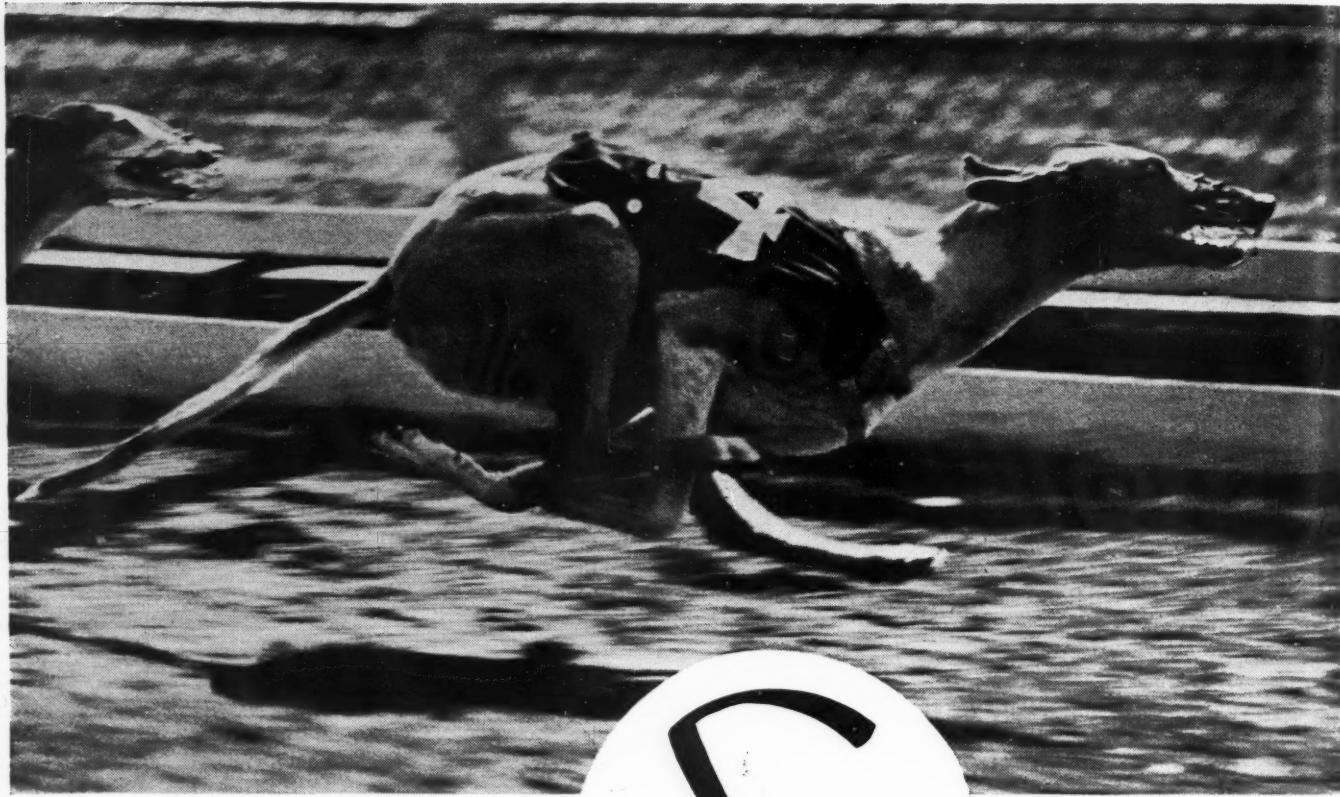


Fig. 10



Give 'Em *Speed* with

That's the job of the service

MAYBE we've used the wrong word in this business of making peoples' cars fit to drive. We talk about safety. Sure, they want to feel their cars are O.K. to drive at high speeds day and night, but how many cars are?

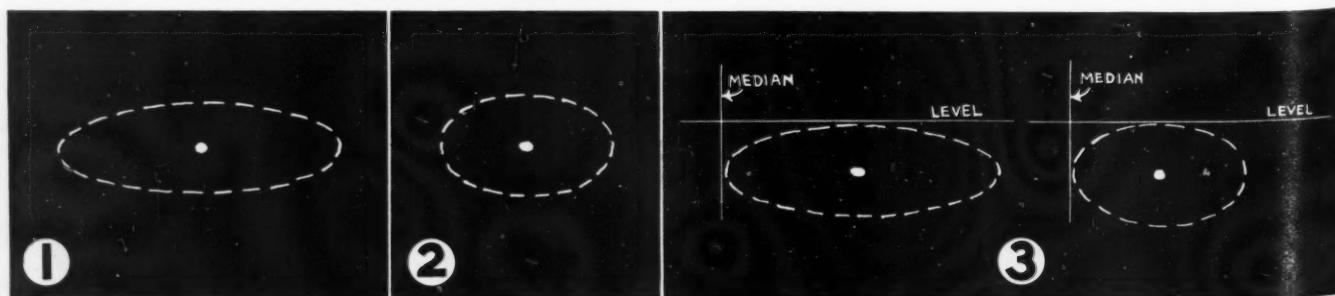
"We've got one hundred mile-per-hour roads today, but very few on the roads should be traveling at the rate they are. However, people are in a hurry to get somewhere. Everything has speeded up. We must do our service work faster—while the customers wait, if you please. Just seems to me as long as folks have had a taste of speed, they are always going to want it

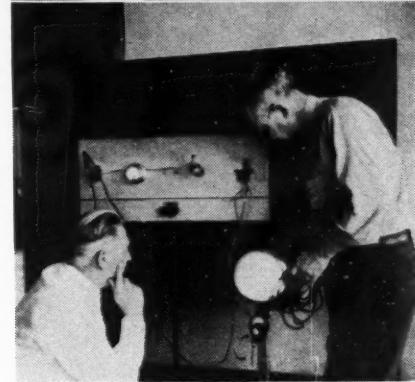
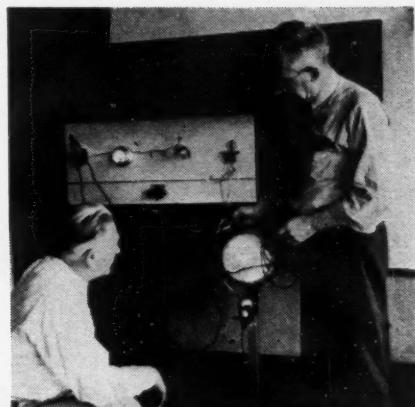
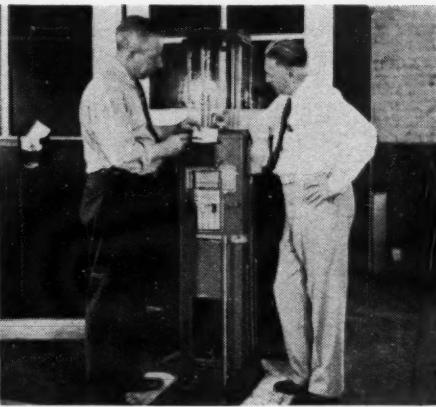
and that's why I say maybe we should make them speed-safety-conscious instead of just safety-conscious.

"Although forty per cent or so of cars tested in official inspections have to be first rejected (then repaired and approved) only a very few owners of these rejected cars realize before the test that their cars are actually unsafe. I don't need to tell you that outwardly cars may look like new and yet have hidden defects that make them dangerous to drive at the speeds their

owners want to make. Why, I'll bet in your own case you think you've got the best lights you can possibly have and maybe you believe your car's steering is right on the head. Of course, everything may be O.K. as you think, but let's check your lights just for fun."

And that's the way an old-timer talked to me the other day. I mean L. R. Alexander, who many other old-timers will associate with long years of Pierce-Arrow service and will remember as the first president of the Service Managers Associa-





By
B. M. IKERT
CONTRIBUTING EDITOR

Safety man today

tion of Detroit. His background qualifies him to talk with authority. He has been and is servicing all makes of cars. Today he is manager of a garage that is literally a proving ground of automotive servicing. And it was here that he passed on information invaluable to every service man in the business.

Just for fun he and I checked the lights on my car. My own service-man, an honest boy who really thinks he is doing a job for you, had told me my car was ready to drive and like thousands of other

car owners I took for granted everything was as it should be.

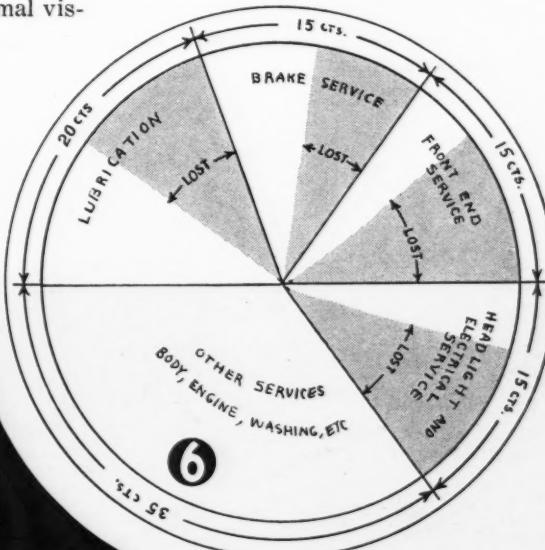
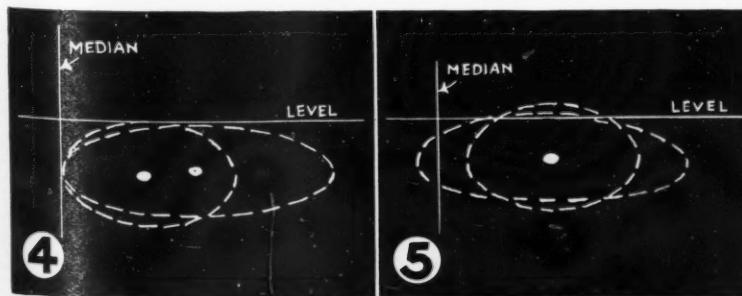
"Alex," as they fondly call him down in Springfield, Ill., said that very often he is able to give a car owner twice and three times as much light "and we don't do anything to the lights themselves."

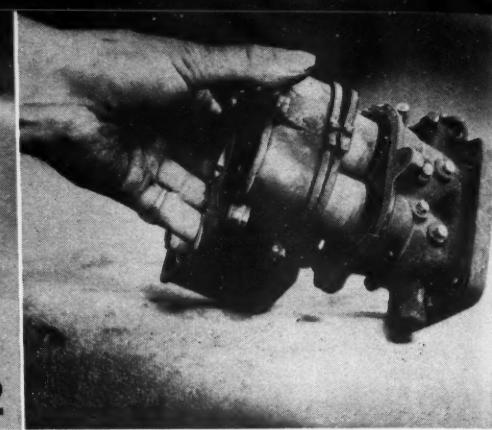
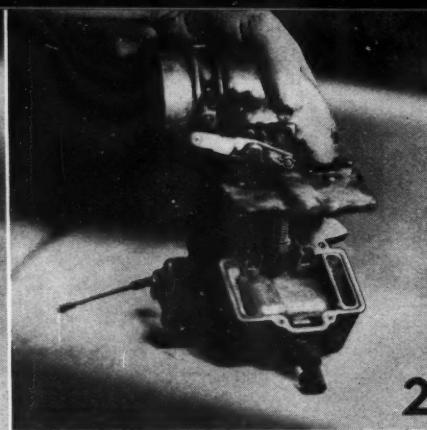
First, I was asked how fast I drove at night. Around 50 was my answer. The lights on my car were checked for aim as well as candle-power. He had on the wall a chart that showed the approximate safe speeds for drivers, with normal vision, driving cars with good brakes and lights properly aimed.

Was my face red, as they say, when my lights were tested. They should have showed around 35,-

(Continued on page 42)

(Top Left) Mr. Alexander showing by chart how he stepped up the candle-power to make speed of 50 m.p.h. safe at night. (Top Center) Brake action has to be "timed" just like ignition and valves. Car owners can get a picture of their brake performance with this kind of equipment. (Directly above) Here is the apparatus rigged up by Mr. Alexander to demonstrate proper headlighting. Note that in the upper photo the headlamp is not as bright as in the lower. This is because of high resistance caused by poor contacts. A jumper, as used in the lower photo, cut out this resistance, and the light flared up. The lamp itself was not touched.





3 4

Servicing Stromberg

BY
BILL TOBOLDT

1. After removing carburetor from engine, disconnect link between throttle and accelerating pump arm.

2. Remove machine screws securing upper casting to center casting and lift off upper casting including the accelerating pump piston.

3. Remove machine screws holding lower casting to center casting which will permit the separation of the two castings.

4. Remove screws holding throttles to throttle shaft. Remove throttles and then withdraw throttle shaft from carburetor casting.

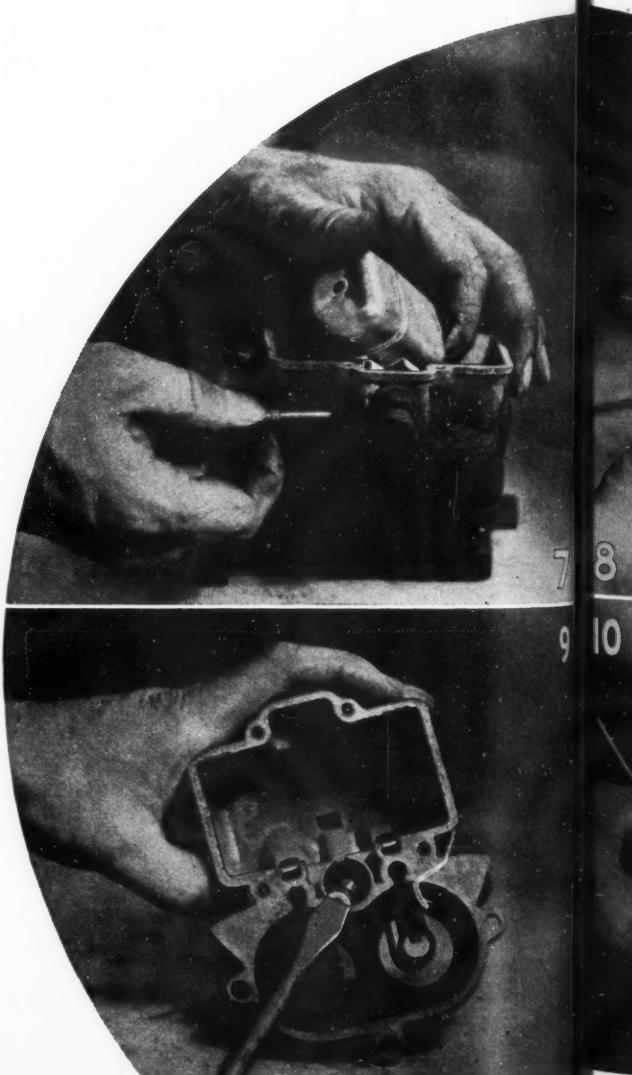
5. Remove split pin from upper end of accelerating pump shaft, disengaging pump shaft from operating link. Remove screw securing pump operating link to carburetor body and remove link.

6. Lift out baffles (if carburetor is so equipped) from carburetor float bowl.

7. Remove screw from inside of carburetor casting, permitting removal of carburetor float.

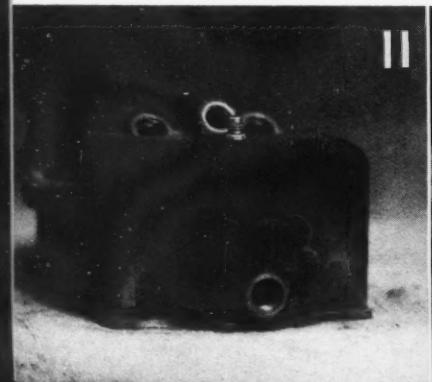
8. With wrench, remove float needle valve and seat.

9. With large screw driver, remove economizer valve from carburetor body.



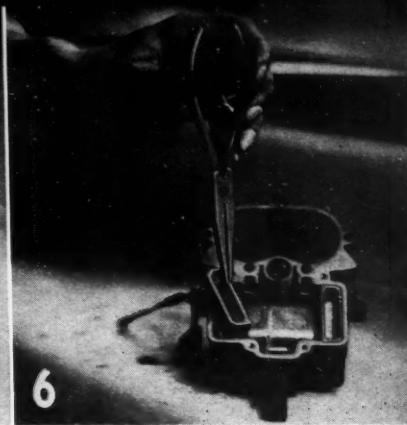
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9 10



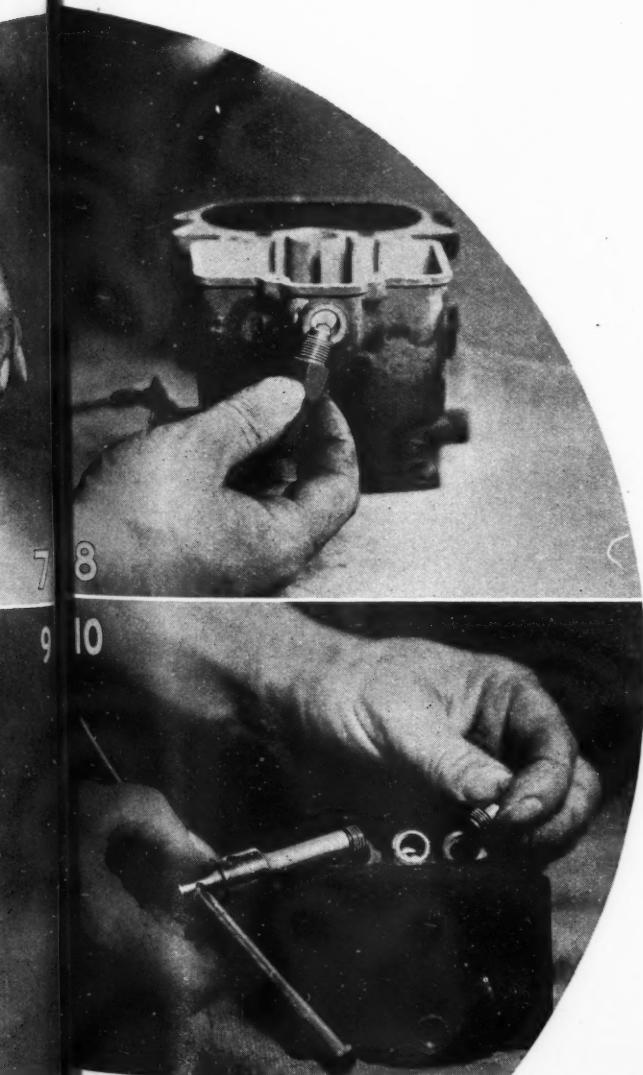
11 12

13 14



Carburetors

Details of Disassembly of Model EE22 Stromberg Carburetors



10. With special socket wrench remove main metering jets after having first removed metering jet plugs. Note—Socket wrench for removing main metering jets can easily be made by taking short length of steel tubing of proper size and flattening the sides.

11. With small screw driver remove check valve. Note—On some models of the EE 22 carburetor, the check valve is removed through the interior of the float bowl. On others, as shown in the illustration, the check valve is removed from the outside, after first having removed a plug.

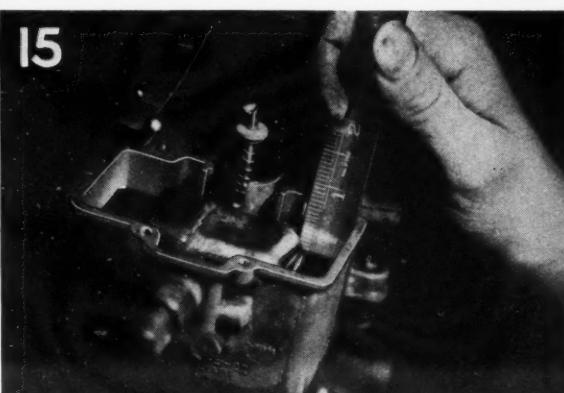
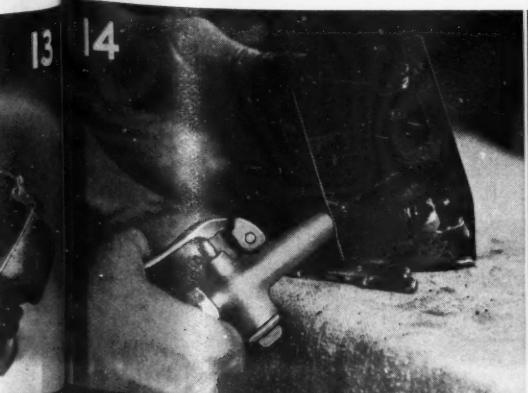
12. Remove idle adjusting screws, also remove idle discharge plugs located directly above idle adjusting screws.

13. Remove idle tubes with small screw driver.

14. With compressed air, blow out all carburetor passages, and then with acetone clean all parts. Then reassemble, reversing the procedure outlined. Use gaskets and other parts where necessary.

15. Measure fuel level. Correct level for all models can be secured from the Chilton Flat Rate manual.

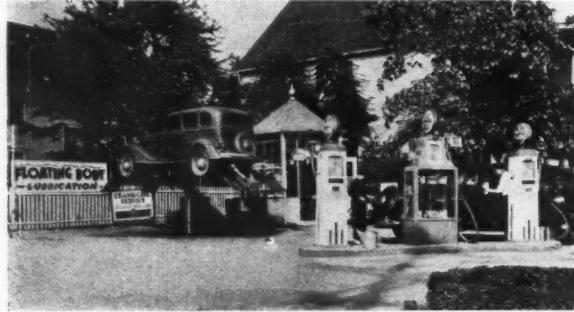
16. While not absolutely necessary, installation of the accelerating pump piston is simplified if a special sleeve is used. This prevents distortion of the pump leather.





BY
T. N. THOMPSON

Wake Up and Live



J. F. Seaman's station before and after he discovered the value of lubrication work as a "feeder" for all his services.



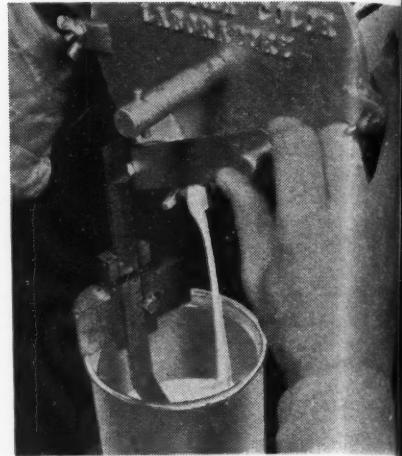
REGARDLESS of how bad business seems to be, there still are plenty of repair shops, making money. You will probably say to yourself; yes, maybe that's true, but they haven't the obstacles, or bad business conditions to buck up against that I have. Well, mister, that's like the habitual drunkard who is going to swear off drinking—he sympathizes and excuses himself so much that he can always find a good reason for not trying and a thousand reasons for another twister. And isn't it a fact that most of us are always looking for the line of least resistance? In other words we're lazy, both mentally and physically. How we love to alibi and resurrect some swell excuse for not trying to do this or that, just so we don't have to take the initiative and go out and really do something about our so-called sick business.

The fellow that's making money today is far too busy hustling, ringing door bells so to speak, to worry much about himself. He's not sitting around sympathizing and looking for a lot of excuses and childish reasons for not going out plugging after business. If you could take the successful man in any line of business and dissect him, you would find he is composed mostly of common sense, fearlessness, hard work, honesty, and gratitude. You, Mr. Repairman, can rise out of this slumber and really do something about making something—money. Step up and out of the average method of operating and come on over to the other

(Continued on page 34)



"But, darling, I was talking about my piston when I said my skirt wasn't true!"



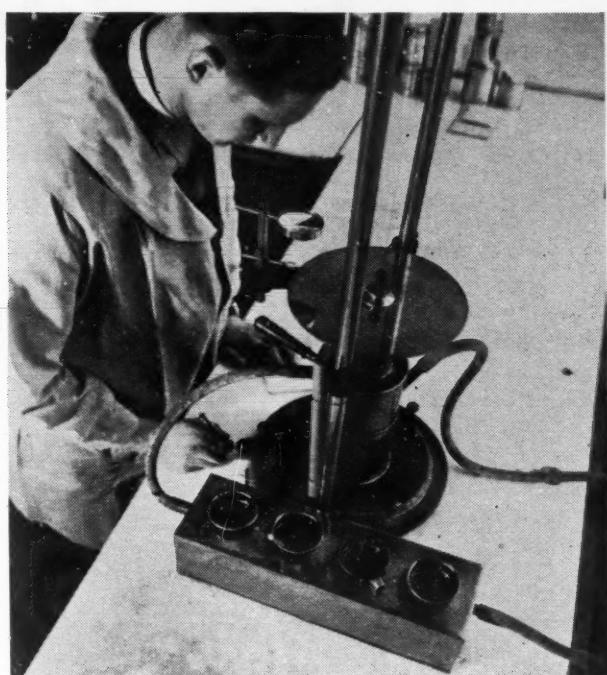
Raising the Blinds on Color Shades

Paul Hexter's knowledge of color photography led to the elimination of guesswork in mixing lacquer

Paul Louis Hexter, inventor of the Arco color machine and manager, refinish sales division, of the Arco Company. (Above) Laboratory chemists check tinting strength and viscosity of Arco lacquers before a production batch may be packaged.

IT may seem like a long distance from colored photography to a machine for mixing colors for refinishing automobiles, but Paul Louis Hexter, secretary of the Arco Company and also sales manager of the refinish division, used his knowledge of color photography and chemistry to evolve the fundamentals of the Arco Color Mixing Machine.

Every man who has painted an automobile knows the difficulty in matching colors. In days gone by, the mixing or matching has been done by the painter on the job by the "cut and try" method. As the result of personal experiments in making plates for color photography, Hexter propounded his theory that if it were possible to procure base colors of constant tinting strength and also be able to measure definite quantities of such base colors of constant tinting strength, it would be possible



(Top left) A section of the plant in which lacquer pigments are stored. (Top right) Storage tanks in the Arco plant.

(Left) Not until production and laboratory men say "O.K." does Arco lacquer leave its storage tanks.

to get a definite color in mixing. As an indication of the accuracy required in measuring the quantity of pigment required when making a specified color, Paul Hexter pointed out that the tinting color contained in the minute circular ridge at the bottom of a paint can was sufficient to change the color of the mix.

Hexter discussed his theory with the research chemists of the Arco Company who at first declared that while it was probably possible to develop means of accurately measuring quantities of the pigment for mixing purposes, that it was impossible to develop base colors of constant strength.

Lacquer consists essentially of the basic color material in powder form which is known as the pigment which is mixed with a liquid known as the vehicle. Grinding in lacquer constitutes not the breaking up of the particles of the pig-

ment but the wetting of each individual particle as thoroughly as possible with the vehicle. In other words, grinding is actually forcing the vehicle around each individual pigment particle. The nature of the vehicle, the nature of the thinners, heat, humidity and many other factors influence the wetting of the pigment. If the pigment is 100 per cent wet, the full color is brought out. If less than 100 per cent wet, the color will not be full strength.

The Arco laboratories knew four years ago that while tinting an ordinary base mixing color it was possible to bring it to the correct shade with another standard color, but after it had been mixed with another color, the tinting strength would vary. For example, suppose a red has been slightly toned with black. Then, if this toned red is mixed with green it would probably tint ex-

actly the same as the standard color, but when mixed with yellow, the tinting strength would probably be slightly different. And it was this problem of obtaining base colors of constant mixing strength that Hexter wanted to solve.

After three years of experimentation, the Arco Color Mixing Machine was developed. The accuracy of mixed colors is dependent on the use of base colors made without the use of toning colors. In other words, they are single colors without any additions. To do this Arco developed a manufacturing process which is claimed to bring out 100 per cent of the color strength of the pigment used. The method is known as Mono-Molecular Dispersion Process and it necessitates holding batches of color in tanks for many weeks to get the correct color strength.



Creating Jobs with Guns

Better and lower priced cars and more jobs for workers have resulted from the development of the spray gun by the De'Vilbiss Company

**BY
BILL TOBOLDT**

JUST 50 years ago a young doctor, urged on by an epidemic of throat ailments, leaned over a work-bench in the wood-shed at the rear of his home, striving to find some means of spraying semi-solids such as petroleum jelly which was the accepted medicament for treating throat ailments at that time.

That man was Dr. Allen De'Vilbiss and when success rewarded his efforts he didn't realize that his initiative, energy and resourcefulness would be the foundation on which was built a company whose products would be known all over the world and which would give direct employment to over 1000 men. But even reaching further than that, it has given employment to countless thousands more in allied industries.

But Dr. De'Vilbiss didn't think of those things as he labored over his nasal spray in 1888, he was thinking more directly of the alleviation of human suffering. How well he succeeded can be told by a glance into any doctor's office or in anyone's medicine closet, where De'Vilbiss medicinal atomizers will undoubtedly be found.

Blowing petroleum jelly into a man's throat and spraying paint on an automobile seem wholly unrelated. Nevertheless, it is a true

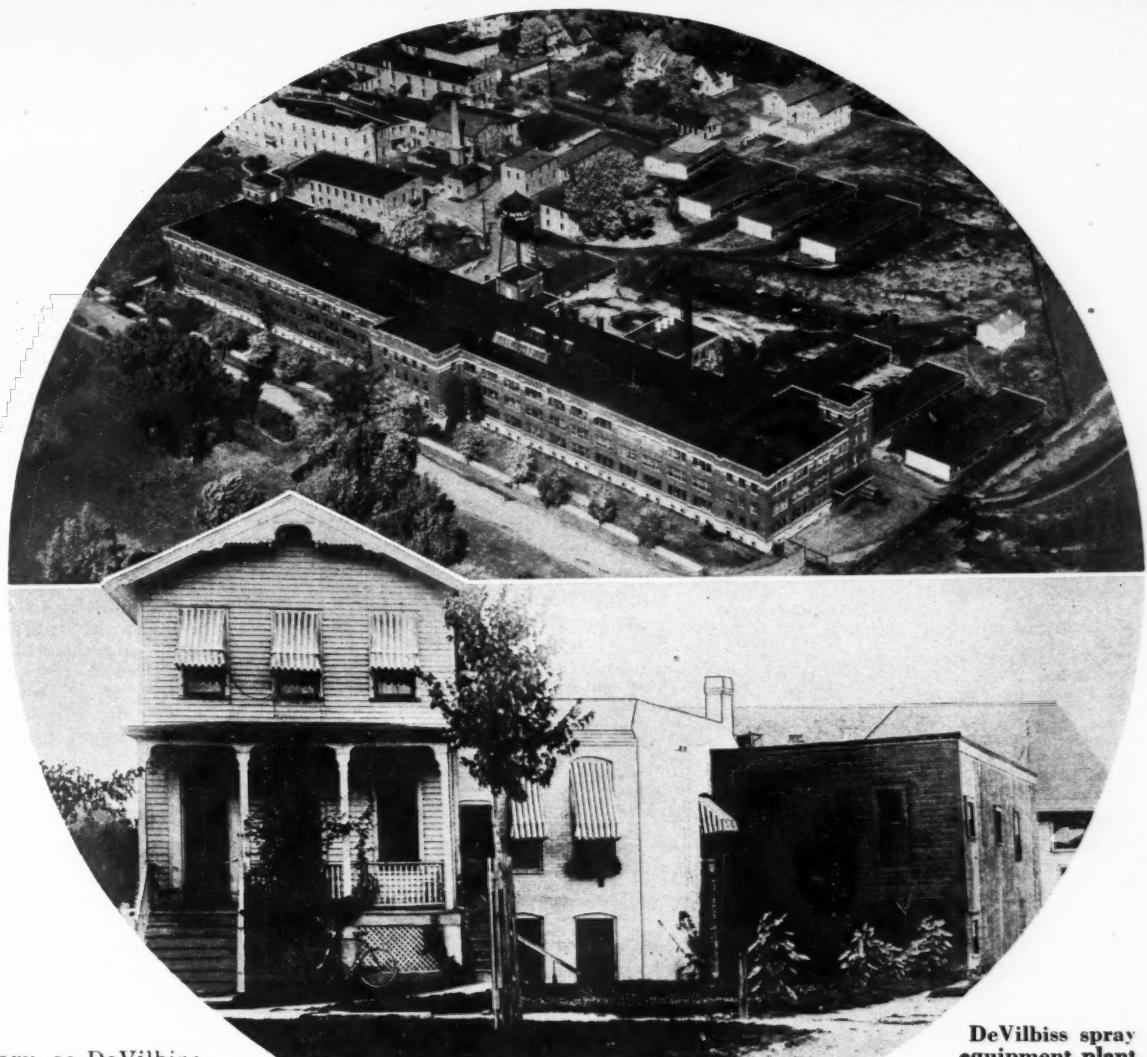
story of American enterprise, a story that could only be true in a country which leaves its citizens free to think and free to act and where the rewards are only limited by effort, ingenuity and ability of the individual.

Under its founder the company had its initial growth and at the end of 17 years it had an annual volume of \$40,000. Perfume atomizers were added to the line at the instigation of Dr. Allen's son Tom, who with his brother Allen, Jr., had grown with the business. But it was not until 1910 and after the company had moved to new and larger quarters, that the paint spray gun was developed. This was the result of Tom De'Vilbiss' experiments which started in 1907, and by 1911 the volume



on this item alone reached \$30,000. At first the gun was used mainly for spraying furniture and it was not until 1920 when quick drying lacquer was discovered that the automotive industry received the full benefit of this new tool. As a direct result, of the spray gun and quick drying lacquer, the price of automobiles was reduced, production increased and employment given to additional thousands. Without the spray gun the price of cars might even today be such that only the wealthy could enjoy them and consequently the number of employes would be greatly reduced.

But the spray gun is only one item used by the automotive industry and manufactured by De'Vilbiss. When spraying lacquer,

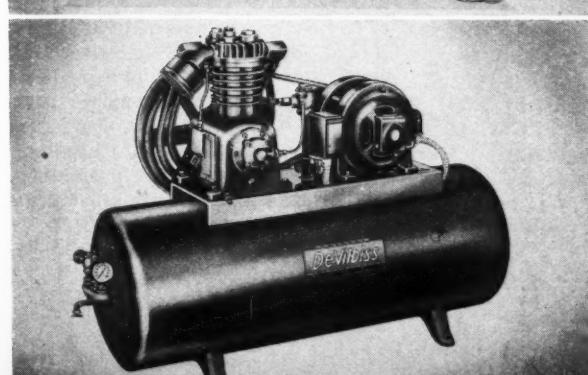
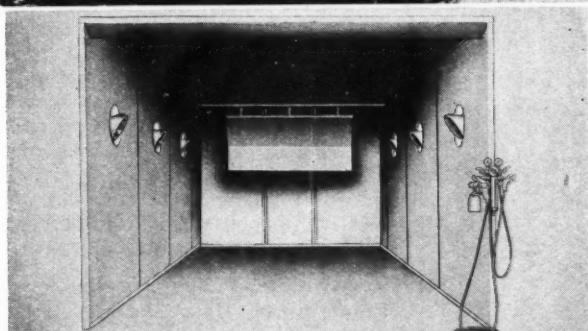


DeVilbiss spray equipment plant.

The "plant" where DeVilbiss products were first produced in quantity.

DeVilbiss exhaust system (spray booth).

DeVilbiss Air Compressor



booths are necessary, so DeVilbiss builds spray booths with complete ventilating systems to protect the worker. In 1927, air compressors were added to the line and later rubber hose designed especially for the work was offered to the industry.

Naturally with the increase in volume and number of items it was necessary to expand the plant, not once but many times, until today the plant occupies many buildings and when B. C. Gardner, sales promotion manager, was asked the extent of the floor space he said that it would have to be measured in acres rather than square feet.

Of particular interest is the fact that with all the development
(Continued on page 57)

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Service Hints from The Factories

Chevrolet Runs Backwards

To remedy the trouble of Chevrolet engines running backwards when key is turned off, set idle not to exceed 7 m.p.h. Be sure throttle valve does not stick. Assemble thermostatic spring to heat control valve shaft in exhaust manifold. Wind just enough to slip it over pin in manifold, and no more. This is approximately $\frac{1}{2}$ turn of the spring. It is very important that spring is not wound up as poor engine performance will result.

Clutch Finger (Toggle Lever) Adjustment—on Studebaker

Listed below are the Clutch Finger (Toggle Lever) measurements, as measured from the clutch hub to the contact surface of the clutch fingers on Studebaker cars.

Model	Measurement
51 and 52 Erskine, Grafite	1 13/32 in
Shifter Bearing	
FC-GL-53-54-61 Grafite Shifter	
Bearing	1 3/16 in.
All President 8 except 91	1 in.
GJ-FD-70-54-32-C Ball Shifter	
Bearing	7/8 in.
55-62-71	27/32 in.
EW-ES-GB-GH	19/32 in.
B-56-73 Rockne 65, Rockne 10,	
President 92	11/16 in.
EU-GE	5/8 in.
1A	29/32 in.
1B-1C-2C-3C-4C	13/16 in.

Pontiac Clutch Spring

The clutch helper spring on 1938 Pontiac cars may squeak after the initial lubrication applied at the factory has worn off. The remedy is to thoroughly oil the parts, making sure that the felt on the strut is saturated. Thoroughly lubricate at all points marked "O" in the illustration.



"While we were putting that one together, the boys got to reminiscing!"

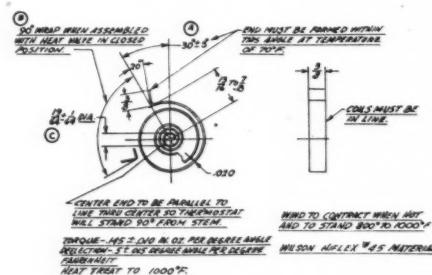
Pontiac Tie Rod

In order to break the seal at the top of the ball joint when lubricating the Pontiac tie rods, it is suggested that the tie rod ends be tapped lightly with a hammer at the bottom. This will eliminate the possibility of blowing out the Welch plug and assure lubrication around the ball and seat.

Flat Spot or Poor Acceleration

Several carburetors have been removed from 1938 Studebaker Presidents and returned because of improper engine performance. In some of these carburetors, the choke did not open properly because of an air leak around the thermostat cover. This condition allowed cold air to be pulled in around the thermostat rather than hot air, and resulted in the choke staying closed too long.

A service correction can be made



by placing a small flat washer (Stromberg part No. P21032) under the screw heads which hold the cover in place. This procedure will draw the cover tight against the cork gasket and make an airtight seal.

Another factor that may cause poor acceleration or a flat spot is a manifold heater valve thermostat that does not operate properly. The accompanying illustration shows the position of the outer end of the thermostat spring relative to the inner end at 70 Deg. F.

**Re-Location of Master Passenger Car
Front Spring Rear Shackle
Alemite Fitting**

The method of assembly of the front spring shackle on Chevrolet Master passenger cars on left hand side only has been changed by reversing the bolts. This will bring the Alemite fittings on the inside of the shackle. This is to eliminate any possibility of interference of the drag link and the fitting on the spring shackle.



"Tamping" Oldsmobile valve guide holes with 200,000 blows per minute. Operation at Oldsmobile factory provides mirror finish inside valve guide holes. Small parallel rollers similar to short needle bearings are loosely locked in the ends of the rods shown in the photo. A revolving cam inside the rod, shaped like the "agitator" used in stirring malted milk, forces the rollers outward. They strike the sides of the hole at the rate of more than 3300 blows per second, pounding down the microscopic irregularities or "points" which, if allowed to remain, might pierce the film of lubricating oil and permit metal to metal contact.

Gas Tank Unit Shorting on 1938 Trucks

A change has been incorporated in production on the bottom strainer of the seat cushion spring assembly on Chevrolet cab models to eliminate any possibility of the gas tank gage unit shorting. However, the "U" section strainer of the seat cushion spring assembly may be bent slightly to give clearance between the flange and the gas tank gage on present models.

Studebaker Front Wheel Removal

Whenever it becomes necessary to remove the front wheels on Studebaker 1938 models, they should be returned to the same position of the hub. The most satisfactory way to be sure that they are correctly placed is to mark the position of the wheel on the hub. The usual reasons for removing the wheel are to repair tires, or to change the position of the tires on the car. In either of these cases, rebalance the wheels, tires, hub and drum assemblies to prevent the possibility of a steering disturbance. The wheel hub and drum assemblies for one side of the car are marked with paint on the stud and nut solely for production purposes and have no bearing on any service procedure.



THE READERS' CLEARING HOUSE

of

Service Men's Queries

A LETTER FROM CAL CROOKS

I will not attempt to explain to Mr. Condit [see June MOTOR AGE, p. 23] why your method of timing an engine should work but will give a few of my experiences as just a plain tune-up mechanic and not one that has been injured by contacts with our most respected and well educated brothers—the men who are called automotive engineers and sit at a drafting board plotting curves day in and day out and decide through their curves that an engine should be set to the markings that they set forth.

However, in 1927 the Chandler Cleveland Motors Corp. sent me as a picked service representative to go to a small town—Addison, N. Y.—to overcome motor difficulty in the Chandler Royal Eight. This was, according to Mr. Condit's letter, just one year after he had engaged in the most delicate matter of tuning engines.

In the first test of this Chandler engine I found that when the markings were used for timing, the engine would break up at 60 m.p.h. and would continue to fall off in speed until the bottom of 40 m.p.h. was reached. This proved one thing—the power curve was wrong in relation to the automatic spark advance curve.

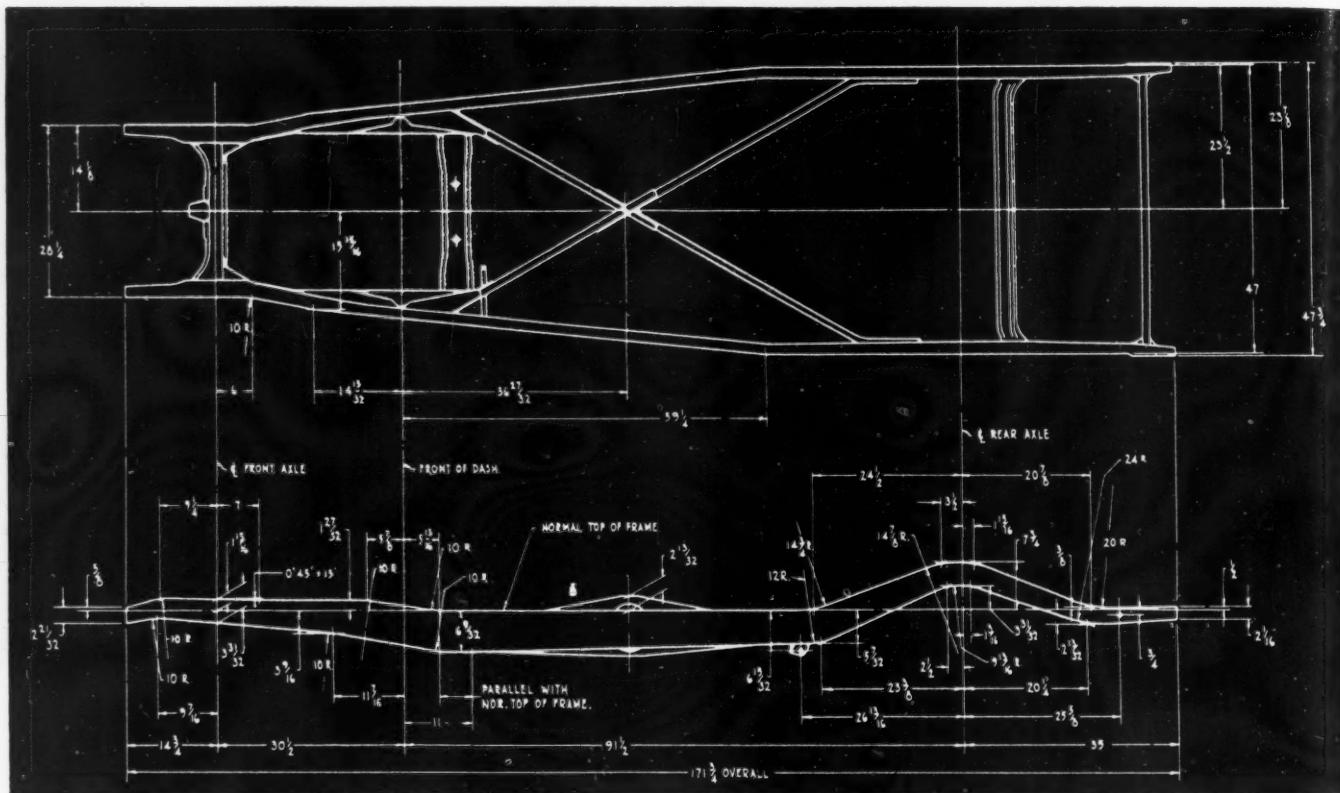
The next move was to learn the proper peak of power advance in that distributor, there was only one way—jack up the rear wheels and bring the speedometer to the point where the motor would break up. After doing this I found that the distributor was 10 deg. fast according to flywheel markings and was too slow to idle when set to proper timing for this high speed performance. So through just an act of

BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of MOTOR AGE together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.

common sense, I changed the size of the pin that controlled the automatic advance so that I could obtain the proper idle setting of the distributor and have a high speed setting that would not break down.

After correcting this trouble, which was due to the fact that the motor

(Continued on next page)



1938 Studebaker President Chassis Frame Dimensions

heat range was not considered by the engineers, the Delco people were instructed to build all of the distributors to conform with my changes of 10 degrees slower advance at high speed.

Incidentally, in speaking of race track stars, Mr. Ralph Mulford of Red Bank, N. J., will remember this incident, as he was employed by Chandler at that time and apparently this condition was beyond his calculations.

The speed of this engine was so greatly improved that the Chandler was named the Model 85 the following year, just ten years ago, because it was enabled by this change to reach the speed of 85 m.p.h. instead of 60.

Does Mr. Condit know that the heat range of every engine is different? That the combustion ratio of every engine is different? That the octane of gasoline changes every time it is exposed, and each car has different gasoline? That there is a different battle between compression ratio and induced current going on in every engine? That the diametric changes in the earth surface have an effect on all cars?

So, I shall ask him this question. If each engine is set conscientiously according to its characteristics in the manner that you have set forth—why isn't it right?

As for betting, I will bet as much as I can on my ability to get at least

75 per cent of the cars that I tune-up correct within 2 degrees of dynamometer setting and not have excessive ping. That is more than can be said by a man who plots curves or sets timing by flywheel marking. Cal Crooks, 9 Sycamore Street, Springfield, Mass.

TIPS ON WILLYS CLUTCH REMOVAL

After reading the MOTOR AGE for two years, I have at last found something I think I can help you with. But first allow me to say that your May issue is the best yet. I especially like the article on the Indianapolis racing job. I am interested in a midget that we have been racing this year here on the Pacific Coast and as soon as Chip gets a little more experience herding it around, you boys will be hearing about us.

Now I realize that all mechanics have a way of doing things and nine times out of ten, they differ. I would like to set down the way, step by step, that we remove the clutch on a Willys 1936 to 1938.

1—Remove floor boards.
2—Disconnect speedometer cable, universal joint, clutch release control cable.

3—Remove starting motor.
4—Jack up front end of car and place stands under front axle.
5—Remove bolts around the bottom of the flywheel housing. Remove the nuts from the bolts that hold the rubber cushions in place at the rear of the transmission.



"I'll let it go for ten dollars—and throw in a stamp so you can write to Motor Age Clearing House."

6—Remove all bolts from around housing on top side.

7—With small hand jack under crankcase (a block of wood should be used on top of jack to save denting pan), jack motor and transmission up, being careful not to snap rubber button off the accelerator control (bolted to the back of motor).

8—Remove rubber cushions and metal flange, jack motor up until transmission clears floor board and out she comes.

Bill, believe it or not, I would rather do the job than sit down and write about it, but if it will help someone I guess it is worth it.

Another thing that we found out. On 1937 and 1938's, it's a good idea to remove the shifting lever before trying to remove the center part of the floorboards.

Transmission or clutch removal is the same on 1936, 1937 and 1938. On the 1935 back to 1933 the operation is the same except the rear motor support has to be removed and the bolt has to be taken out of the rubber support at the side of the transmission.

Hope this will help. A Willys mechanic in Frisco.

CHEVROLET RACER

I am building a Chevrolet 1928 four-cylinder engine for racing purposes. I am going to lengthen the connecting rods to raise the compression. This motor has already been re-bored to $3\frac{3}{4}$ in. Will you please tell me just how much the compression ratio should be in order to get the most out of this engine? I am using an Olds four head on this job. This head is flat underside just like the original head. It would be better still if you can tell me just how close to the top of the cylinder the top of the piston should come when on top dead center. I am using the regular Chevrolet crankshaft. O. C. Scott, Scott's Garage, Sylacauga, Ala.

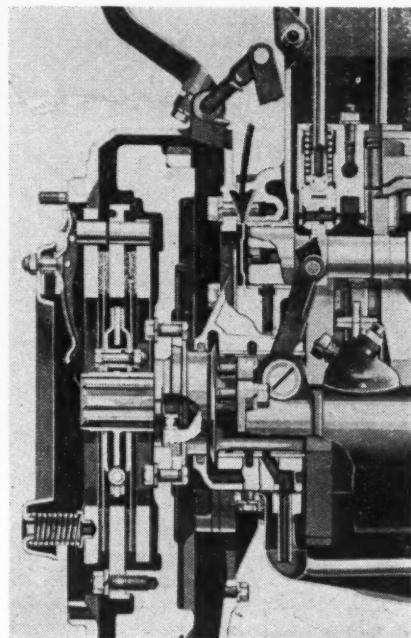
THE 1928 Chevrolet engine had a compression ratio of 4.5 to 1 and developed 35 h.p. at 2200 r.p.m. It seems to me the first thing for you to do is to determine what the compression ratio is with the Olds head and the standard Chevrolet rods. It will be somewhat higher than 4.5, I believe, because the Olds developed over 40 h.p. with an engine of the same bore. Then, you will know how far you have to go to raise it.

If you are going to get anything worth having out of this job, I believe you will have to have at least a 7.5 to 1 ratio. Indianapolis jobs last year ran with about 9 to 1 ratios but I doubt that you can raise this job that high on account of the pistons interfering with the valve heads. You might be able to get some dome-shaped pistons which would help.

Pistons ought to come up about flush with the top of the block. Then, I would try to increase the size of the intake valves by widening the

ports and installing larger valves. Give it as much as you can without coming too close to the water jacket. Two carburetors, one to take care of each two cylinders, separate intake manifolds, of course, and the insides of the manifolds polished smooth, will help to get more fuel into the cylinders and thereby give more power.

OIL IN THE CLUTCH HOUSING



I am having trouble with a 1931 Model 50 Buick losing oil through flywheel housing drain hole. Have taken up on mains, replaced lower oil seal and repacked rear main cap; made sure oil returns are clear. Is it possible for this job to lose oil through rear camshaft bearing? Fred Lambert, North Central Service Station, 1730 North Central Avenue, Chicago.

YES, it is entirely possible that the oil leak you are experiencing on the Model 50 Buick is in the camshaft rear bearing. The rear of this bearing is sealed with a Welch plug and if that is loose the oil will leak into the flywheel housing.

It would seem that this would be the source of your trouble unless when you adjusted the rear main bearing it was adjusted so that there is excessive clearance along the sides which would also possibly give you the trouble you are experiencing. However, I am inclined to believe that the trouble will be found in the camshaft rear bearing.

SELF STOPPER

We have a 1930 Oldsmobile which has a habit of stopping at various intervals and acts as though the gasoline supply was cut off. Some times it will run perfectly for 100 miles or so and some times it runs only a few miles between stops.

When this happens there is a snap back in the carburetor like it was out of gas. If the clutch is released and the car allowed to coast several blocks it will take hold again and run perfect for a varied length of time.

This car has had fuel pump completely rebuilt on two occasions, has had new coil, condensers, new carburetor, and breaker points, also new fuel line, and gas tank has been removed and cleaned. Also, gas line put on other side of frame to avoid any possibility of vapor lock due to heat from exhaust manifold.

We also used a vacuum tank and to no avail. This car has had new rings and valve grind. Car works perfectly when it runs. Can you suggest trouble? Harry Grant, Ludington, Mich.

YOU seem to have done a pretty thorough job of attempting to locate the cause of this trouble and (Continued on next page)



"I promised this job for today, but my answer hasn't come from Clearing House yet!"

you make it necessary for me to do some rather wild guessing.

My first thought is vapor-lock. As you know, vapor-lock occurs primarily between the fuel pump and the carburetor. My suggestion therefore is that you build a metal shield over the fuel pump to keep it away from the manifold heat and next, that you install a thick gasket between the carburetor and the manifold. This gasket should be about $\frac{1}{8}$ inch thick.

There is always the possibility that dirt is getting into the carburetor but this should have been pretty well taken care of by cleaning out the gas tank and lines and the carburetor. However, you might try a new screen in the fuel pump and a new strainer screen in the carburetor.

I also suggest that you remove the carburetor float needle and dress it off on the sides to be sure that it is operating freely and not sticking. This last possibility is a rather frequent occurrence and one that is very difficult to locate. I would not assume that the needle valve was not sticking simply because it is a new carburetor.

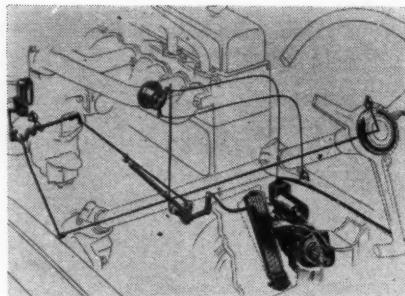
These points seem to be the most likely ones that would cause a condition of this kind and I trust that these suggestions will be of assistance to you in running down this trouble. In addition I would suggest looking for worn valve guides and leaking intake manifold.

STARTER ENGAGES WITH ENGINE RUNNING

I have a Buick Series 40, Special 1937. When idling very slow and accelerating suddenly, the starter will engage with the flywheel. It will do this nine times out of ten even though you try to accelerate it as slow as possible.

Could you give me the cause and remedy? Frank Nickel, Manilla, Ind.

ON your Series 40 Buick which engages the starter when making a quick acceleration, I suggest that you replace the starter vacuum switch.



This switch undoubtedly has a slight leak which permits the starter to engage under the conditions you outline.

Replacing the starter vacuum switch should overcome your trouble.

DO IT THIS WAY

I read an article in the May issue of MOTOR AGE on Chevrolet oil leak at the distributor. The oil drain hole under the distributor is clogged, and can be opened easily by removing the distributor, first marking the position of the rotor so you will have no trouble when replacing the distributor. Also, be careful not to turn the engine while the distributor is out—otherwise you will have to recheck timing.

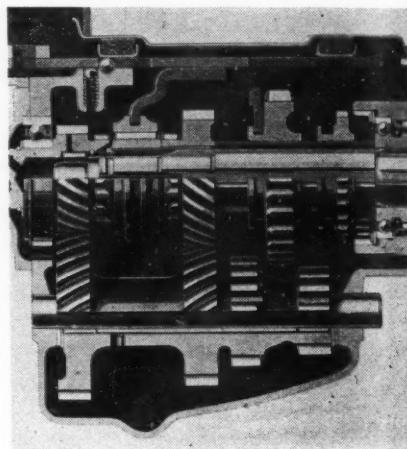
Take a piece of stove pipe wire and open the drain, then pour a little kerosene in and work the wire until the drain is free and the kerosene runs through. Blow the drain out with air to be sure. It is best to do this when the car is in for an oil change, so that you will be sure to drain out the kerosene. When reinstalling the distributor, be careful to see that the drive gear meshes properly and that the shaft is properly connected to the oil pump. This operation takes only about 15 minutes, and stops the leak. Edgar A. Kixmiller, Westphalia, Ind.

HE HUNG IT ON A ROCK

I have a 1933 Plymouth on which the shifting lever comes out of the slot of shifting yoke when in neutral.

This has been so ever since the driver backed over a rock and hung the car on the rock under the emergency brake drum. I put in new rubber supports under the engine and this helped some. Previous to this, lengthened lower end of shifting lever but this did no good.

The slot in the yoke that shifts low and reverse is about $3/16$ to $\frac{1}{4}$ inch longer than the high and second shifting fork which I think has come from surge when car was stuck on rock. Is there anything else we are likely to run into? Frank Wood, 166 Front Street, Deposit, N. Y.



ON your 1933 Plymouth, I would suggest that you replace the shifter shafts and the shifter yokes. In addition, I would certainly suggest that you very carefully check the transmission case and cover as I am inclined to believe that they were sprung in the accident.

It also might be necessary to replace the shifting lever itself.

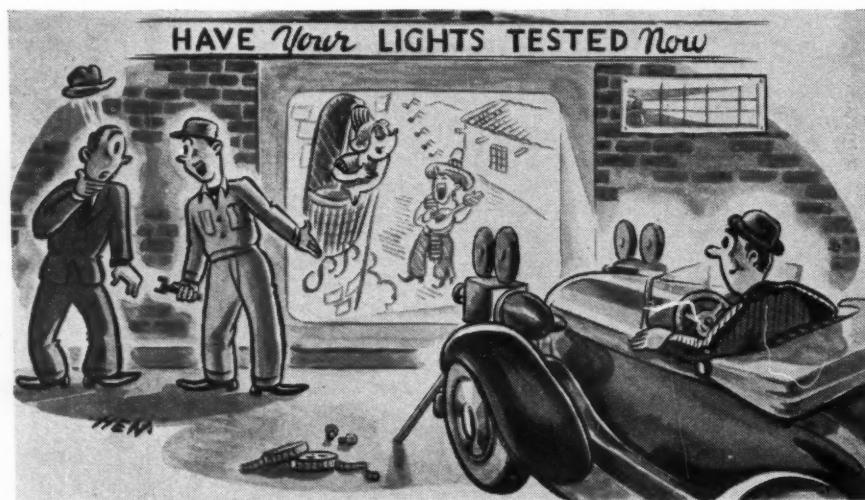
USE TWO HEAD GASKETS

Have been a reader of your magazine for many years and always look forward to each publication and have received a great deal of information from time to time.

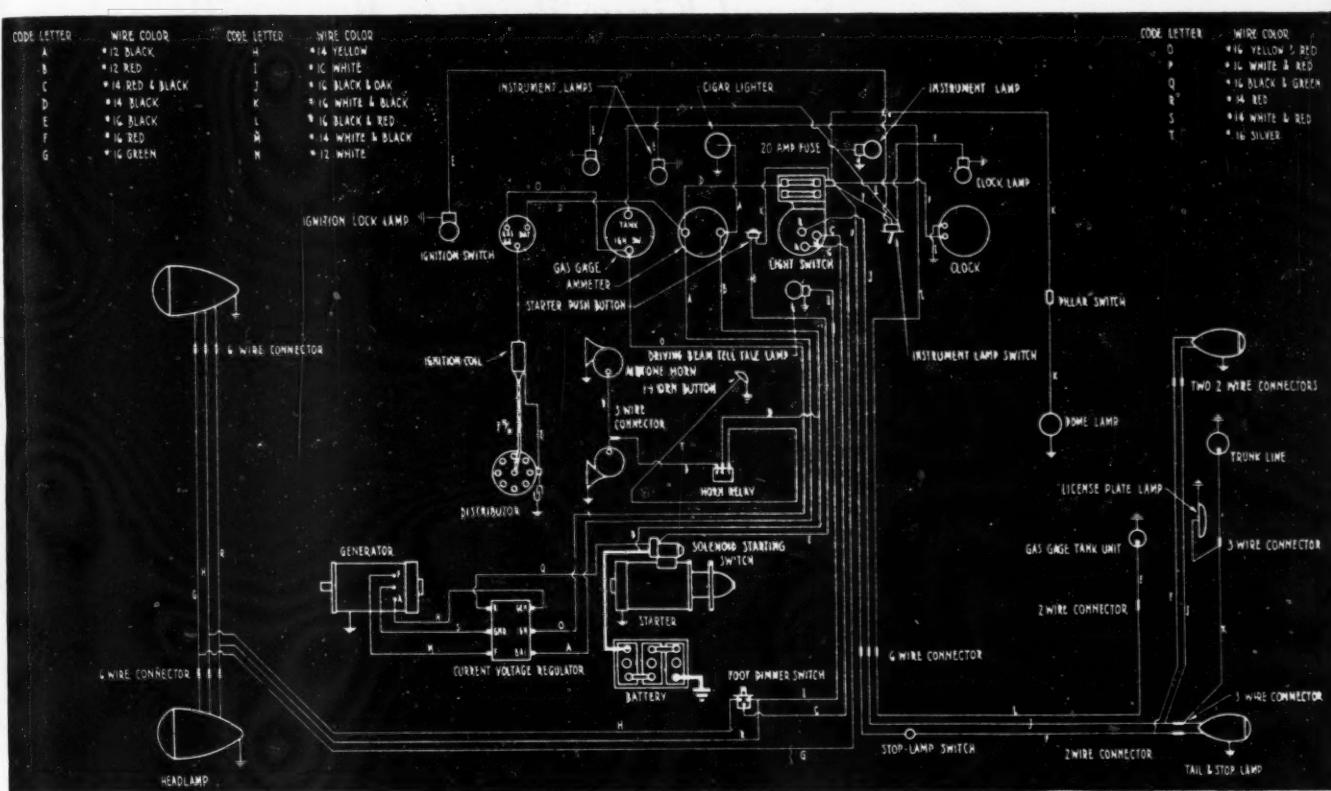
I have a job coming in soon to replace a timing chain on a 1934 Oldsmobile Six and would like to know if one can remove the radiator, shell and grille without taking off the front fenders, or do you have to take the two front fenders, radiator and grille off as a unit at the same time?

This car has a pinging noise on quick acceleration in high gear on level or on pulling up hill slow in high gear. I lay it to a fuel or spark knock. It has an automatic distributor and I can relieve the knock some by retarding the spark but that cuts down its performance.

Would putting two head gaskets under the cylinder head be of any advantage or could an automatic vacuum advance system be installed on this car without too much expense? C. F. Tobey, Tobey Auto Service, 540 Charlton Street, Eugene, Ore.



"It entertains the customer while I'm checking the lights!"



1938 Studebaker President Wiring Diagram

IT is much easier when working on the front of this engine for operations such as installing a new timing chain, to remove the radiator, grille and front fenders as a unit. Of course, it is possible to remove the radiator and grille separately but I am sure you will save time the other way.

The spark knock you mention in connection with this engine is a spark knock and the job really should be run with high test gasoline. If the owner objects to buying this grade of gasoline, the only thing you can do is to install two cylinder head gaskets instead of one. I would not go to the expense of installing a vacuum advance distributor system as I am sure perfectly satisfactory results will be obtained by the use of two gaskets.

CHECK FOR CRACKS

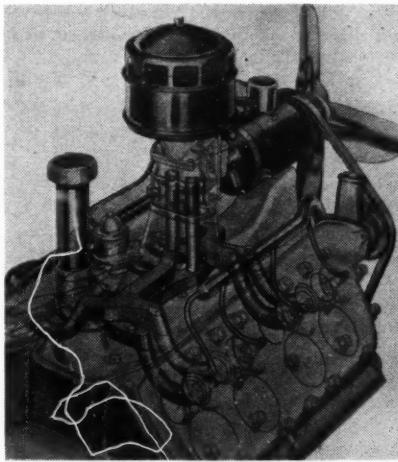
You may be able to assist me in locating a peculiar noise in the motor of a 1934 Ford V-8.

The noise is very similar to that made by escaping compression and seems to come from one cylinder. However, when tested with a gage the compression on all cylinders is equal.

Cutting out different cylinders has no effect but when the normal running temperature of the motor is reached, the noise is eliminated completely.

The motor has a new set of rings in it that have been in use 4000 miles. The noise did not appear during the first 3000 miles. R. L. Harvey, Tenth Street and Twenty-first Avenue, Meridian, Miss.

I SUGGEST that you remove the intake manifold from your 1934 Ford V-8 and make a careful check of it for a crack connecting the exhaust with the intake. Also, install a new gasket.



There is also a possibility that the leak might be in the exhaust manifold although from the description you have given, I am more inclined to believe that you have a cracked intake manifold or a defective intake manifold gasket.

SHOP KINK FROM FRANK KRAGER

Here is a tip given me by a man I work with—Ray Smith, a mechanic of 20 years, and I know it should be a big help to any auto mechanic.

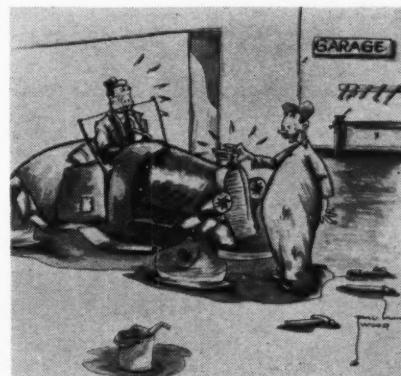
When installing the tapered split

lock valve keepers in today's cars you sometimes run into ones that even the latest keeper tools don't take the place of your fingers. Well here it is—First compress valve spring place locks around valve stem and steady them with either hand, now instead of lowering spring use small screw driver under valve head and gently lift valve up—keepers go all in retainer. Try it. Frank Krager, Steubenville, Ohio.

FORD KINGPIN REMOVAL

In removing kingpins on Ford cars when they are frozen, heat the axle end around the pin and when hot use a battery filler and force cold water through the hole in the pin. The kingpin can then easily be withdrawn.

Too much heat should not be applied to the axle as that would destroy the heat treatment. A. D. McCamom, Automotive Repaid Shop, Lisbon, Ohio.



"I don't know that I ever saw a radiator cap in better condition!"



Skates and beauty, in the person of Virginia Crawford, combine to give the motorist speedy and efficient service at a Miami filling station.

Football played on motorcycles is the latest sport to thrill crowds in Paris. No sissy sport for the game is played under rules similar to soccer at an average speed of 40 m.p.h. Ball is twice the size of ordinary soccer ball.

Trophy donated by Lee Norden, Los Angeles Studebaker dealer, will be awarded to the winner of the most major events in the west coast midget circuit. Shown here are Lee Norden, Dave Koetzler and Ronnie Householder.

Speed Kings Point to Bonneville For Record Attempts

With Captain George Eyston, world land speed king, due to dock in New York City as MOTOR AGE went to press, the AAA Contest Board prepared for a two-way battle for automobile racing's most coveted title.

In the early July schedule of activities at Bonneville Saltbed for this year, Ab Jenkins, America's No. 1 record holder, was no longer considered a possible threat to Eyston's crown this year.

Jenkins had not yet applied to the governing board for an official sanction for an attempt at the straightaway record. Also, he had not come out with definite verification of plans that he was building a super-speed car. Although it has been reported in reliable quarters that Jenkins now has four Curtis airplane engines for a straightaway car, it was the general opinion that Jenkins would confine his 1938 speed attempts to the distance records of 24 and 48-hours, and intermediate points.

With Jenkins figured as a super-speed threat in 1939, this year's battle will be confined to Eyston and his fellow countryman, John Cobb. Both

have reserved dates with the AAA Contest Board for official supervision of their proposals to travel faster than the existing record of 311.42 miles per hour established last November by Eyston at Bonneville.

Eyston sailed from London on June 29 aboard the S.S. Queen Mary and has tentatively listed his record run for July 18. It is possible, however, that his official mile will not be clocked until late July or early August.

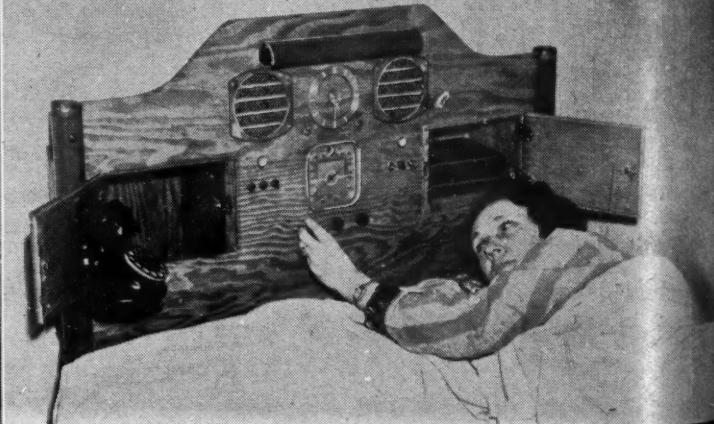
His giant "Thunderbolt" which he described last year as "the craziest car ever conceived" and which carried him to the existing record, was shipped from England more than a week ago.

John Cobb has set down August 21 as his tentative date for the official attempt to unseat Eyston as king of the speed realm. Cobb was to sail from London on July 8 aboard the S.S. Georgie.

His car is a brand new creation, never before wheeled in a record assault. It is turtle-shaped and is powered by two Napier-Railton engines designed by Reid A. Railton, who constructed the famous "Bluebird" cars.

Death beat spectators to the scene when Joseph Paul's Delage car crashed at Brooklands, England. Spectators are shown working frantically to release a victim of the tragedy who was pinned to the fence by the car. One person was killed.

Gadgets galore on the headboard of this bed belonging to Frank Hasencamp of Chattanooga, Tenn. It contains automatic window regulator, bookshelf, telephone, loudspeaker connection to front door, fan control, radio, and many others.



Ohio Court Decision Upholds Official Inspections by Cities

A far-reaching decision by the Ohio Supreme Court upholds the right of cities to set up official inspection stations as part of an organized safety program. This establishes a significant precedent which will doubtless be referred to should municipal testing stations in other states be similarly challenged.

More than a year ago the City of Cincinnati passed an ordinance calling for regular safety testing of all motor vehicles. It was proposed to establish a municipally operated motor vehicle inspection bureau, to which all Cincinnati cars and trucks would be called for safety testing twice each year. For these inspections a fee of 50 cents would be charged.

A taxpayer brought suit for an injunction to restrain the city from carrying out this ordinance, challenging the constitutionality of the ordinance. Pending settlement of this litigation, Cincinnati's plans for official inspection have been held in abeyance. The Ohio Supreme Court in its recent decision upholds in every respect the right of the municipality to establish and operate motor vehicle testing sta-

tions, and to collect a reasonable fee for such tests. The following excerpts from this decision are of particular interest:

"In answer to the contention that the ordinance is unreasonable and discriminatory on the theory that it is the driver and not the condition of the particular vehicle that causes an accident; the answer to this is that accidents may be caused by either or both of these elements. A competent driver with a mechanically defective vehicle may constitute as much of a traffic hazard as a careless driver with a vehicle that is in excellent mechanical condition. ***

"It is apparent that there is no unreasonable interference with interstate or intrastate commerce, and that under its charter the city has simply exercised the powers of local self-government. ***

"The 50¢ exacted by the ordinance is plainly a mere inspection fee and not a

(Continued on page 57)



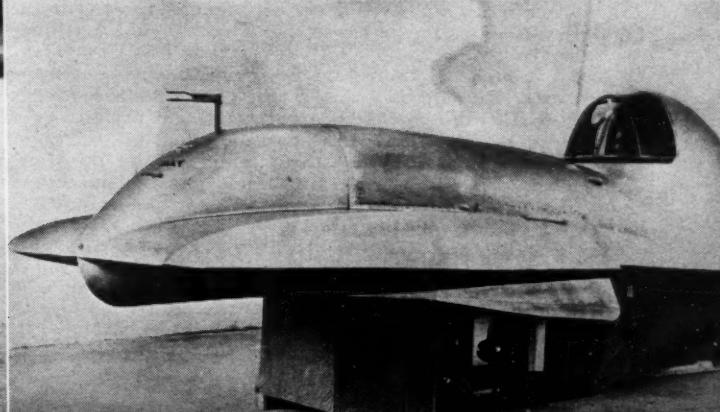
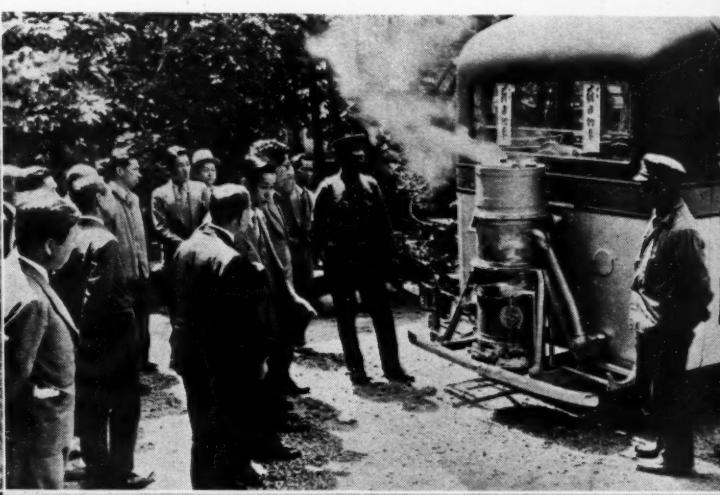
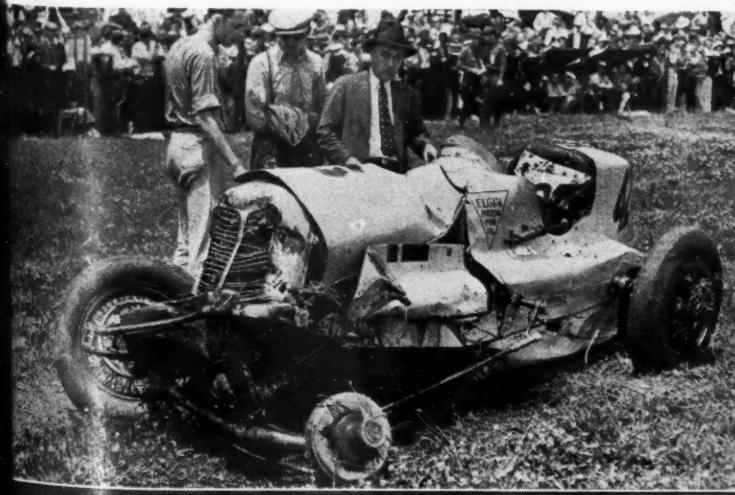
Curve with four wheels off the ground is taken by W. M. Coupe in his Talbot during the Locke King Trophy handicap race held recently at Brookland track, Surrey, England.

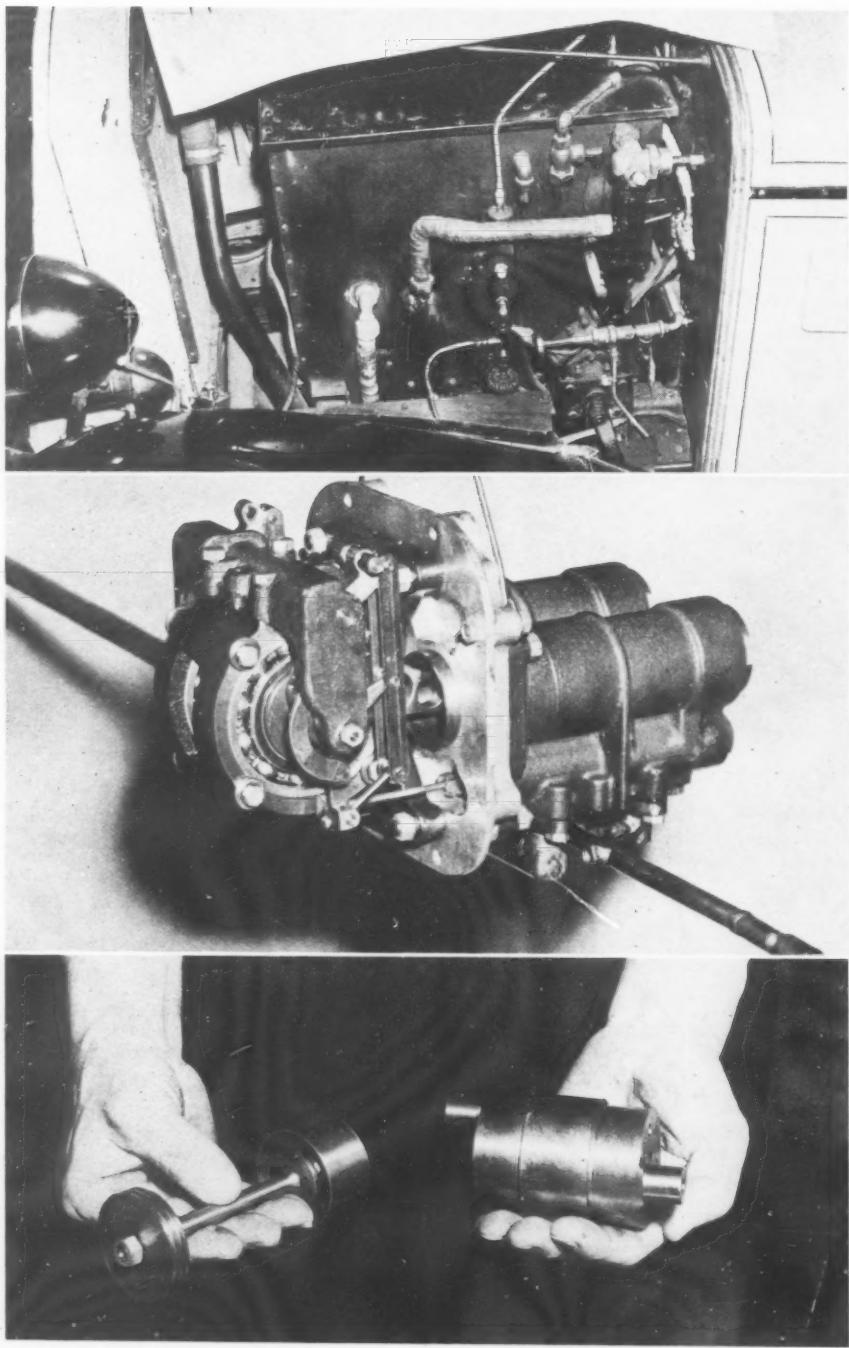
Tragedy marred the thrills at the Indianapolis "500" when Everett Spence, infield spectator, was killed when a flying wheel from Emil Andres car hit him. Andres car was badly smashed when it went into a spin and crashed the wall.

Roaring around a turn is W. W. Bennett, shown in his Alta car as he neared the finish of the Gold Star Trophy Race at Brooklands track, Surrey, England. Bennett took first place in the race with an average of 62 m.p.h.

Charcoal gas for motive power. As part of the nationwide program of conservation, occasioned by the Sino-Japanese campaign, all Tokyo buses have been converted for operation on gas generated by a slow-burning of charcoal.

Speedboat resembling a plane with abbreviated wings was designed in England by E. Spurr in collaboration with the late Col. Lawrence (Lawrence of Arabia). Steering wheel has to be removed to permit the driver to enter the 16 ft. craft.





Come-Back? Is the steam automobile, that puff-puffed its way to popularity in the linen-duster era of motoring, due for a come-back? In a workshop partitioned off from a public garage in Newton, Mass., three men have assembled an eight-cylinder steam engine that they predict will bring new fuel economy, riding comfort and driving ease to motorists. The engine is claimed to develop speeds up to 75 m.p.h. and run 16 miles per gallon of furnace oil, costing only seven cents per gallon. Acceleration is governed by pressure on a pedal.

The engine was designed by Eric Delling, formerly chief engineer of the Stanley Motor Carriage Co., manufacturers of the once-famous Stanley Steamers, and William Lamken, former research engineer for the Stanley Co. Financing the enterprise, known as Steam Motors, Inc., is Gilbert Stevenson, 24-year-old Yale graduate.

No immediate attempt at mass production is planned, but any gasoline auto or truck could be converted, they say, into a steam car for \$1,300 to \$1,500.

With facilities for mass production a complete steam car could be built for the same price as a modern gasoline one, the designers say.

Top photo shows the steam boiler in the position it will assume installed in a car. This unit is in a two-ton truck used in actual road tests.

Center photo shows one of the four two-cylinder assemblies which weighs 40 lb. (total with the four units is 160 lb.). In the left rear may be seen the exhaust pipe. In the front, right, is the pipe used for steam admission.

Lower photo is a closeup of a piston with piston rod on the left and cross-head crankshaft on the right.

A Wrench in the Hand is Worth Two in the Box

Again that invincible triumvirate—men, materials and methods—has produced something indicative of the trends of the times. Lighter, faster and more efficient trains; streamlined and more compact modes in all transportation; more useful forms and constructions—everywhere we see these new accomplishments.

No product seems immune from eventual better design, better material simplification of sizes or number and reduction in weight. Everyone is familiar with these modern trends. They are more noticeable naturally when the item involved is large or spectacular like a railroad train, airplane or motor vehicle, but not always so readily noticed in such inanimate things as tools.

A case in point is the development not so long ago by the Blackhawk Company, of Milwaukee, of its nugget socket wrenches in which one set serves all automotive and specialty work with a saving of some 42 per cent in wrench investment.

It was done by use of a special formula steel called "Hexite." This steel is not new to Blackhawk but has been used by the company for many years in the manufacture of power driven sockets for motor car manufacturers. Being extremely tough and strong this steel allows of smaller design wrenches with an all-purpose 7/16 square drive to handle all work which formerly required both $\frac{3}{8}$ -inch and $\frac{1}{2}$ -inch square drive tools.

For example, here are the actual sizes of the new square drive and those replaced:



It is stated that wrench sets in the past have 76 per cent duplication in socket sizes and handles. In the case of the former $\frac{3}{8}$ - and $\frac{1}{2}$ -inch series for various duties the duplication pictures look like this:



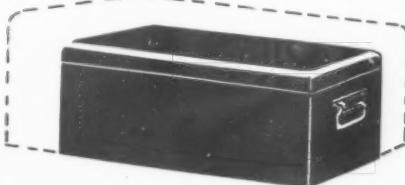
In the newly designed Nugget line there is no duplication but a simplification like this:



Because of the special steel Hexite the 7/16-inch drive serves all jobs. Besides, the new wrenches are smaller, yet as strong as a $\frac{1}{2}$ -inch square drive tool, and they are 31 per cent lighter than the $\frac{1}{2}$ -inch square drive tool.

And, like the modern small and more compact camera, the complete set of Nugget wrenches is 50 per cent lighter and 52 per cent less bulky than a combination set of fifty each $\frac{3}{8}$ -and

1/2-inch square drive wrenches in a metal case.



Finally, in uncovering this development in wrenches the manufacturer said the Nugget wrench has three times the life span of former alloy-steel tools.

Truly, here's a case of where a 7/16-inch wrench in the hand is worth two (3/8- and 1/2-inch) in the tool box.

Wells Acquires Ampco

American Motor Products Co., New York, manufacturer of a full line of replacement ignition parts for automobiles, has been acquired by Ben Sadoff, president of the Wells Mfg. Co., Fond du Lac, Wis., maker of ignition coils, generators and fractional horsepower gasoline motors, and has consolidated the operation with the Wells firm at Fond du Lac, where it is occupying 35,000 sq. ft. in the Sadoff industrial center at Brooke and West Division Streets. Between 75 and 100 workers will be on the payroll by July 1, Mr. Sadoff indicated. He has 17 representatives throughout the country selling "Ampco" products to manufacturers and jobbers, and export connections in the East selling to many foreign countries. The Ampco firm operated in New York for more than 15 years.

Nash-Kelvinator Nation-wide Crusade Designed to "Lick" Recession

What started to be a Kelvinator division, Nash-Kelvinator Corp., intensive sales campaign, promises to snowball up into a national crusade to stimulate sales in every retail line in the country, it was disclosed recently in New York.

More than 1500 sales executives, salesmen, and business leaders heard how the plan of George W. Mason, president of Nash-Kelvinator, boomed from a successful tryout in Lincoln, Neb., and has branched out into fervid, city-wide selling campaigns in more than 100 cities throughout the country. Twenty-one of these communities held simultaneous meetings and participated in the luncheon at the Waldorf-Astoria through telephone hookups, and the program was broadcast over 90 stations of the Columbia Broadcasting Co.

The tryout or proving-ground of the plan in Lincoln, sponsored by the chamber of commerce with the co-operation of automobile dealers, department stores, specialty shops, and stores throughout the city, was announced May 15. Dana Cole, president of the city's chamber of commerce, reported a marked increase of sales in all lines.

During the week set for Lincoln's campaign, automobile sales showed a lively increase, some competitor lines gaining two, three, and four times

Daytona Beach Plans Revival of Stock Races

Daytona Beach, Fla., is reported making plans for renewal of auto speed competition in 1939. The scene of world land speed activity until the trials were moved to Bonneville Saltbed in Utah in 1935 is planning a stock car event similar to the one run in March, 1936.

Officials of the American Automobile Association's Contest Board have been advised that the city of Daytona has budgeted \$5,000 for the event. The date has not been definitely determined.

The 250-mile stock car race run there in 1936 was won by Milt Marion, Indianapolis driver, of St. Albans, N. Y. The event was routed over the famous straightway record mile on the beach and made a loop onto the highway parallel to the beach.

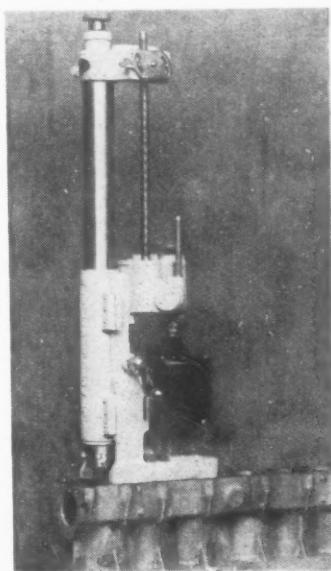
Present arrangements call for the event to be run early in the year, probably in February or March.

Macar Process For Car Refinishing

A new process of car refinishing known as the Macar Process has been announced by the McAleer Mfg. Co., 2431 Scotten Ave., Detroit, Mich. It is said to combine the properties of a cleaner, polish and wax, and does not require the rubbing action associated with the conventional body polish. It is applied with a cloth, and then when dry, rubbed with a clean cheese cloth, and produces a hard, dry, lustrous finish.

Boring Bar Has New Features

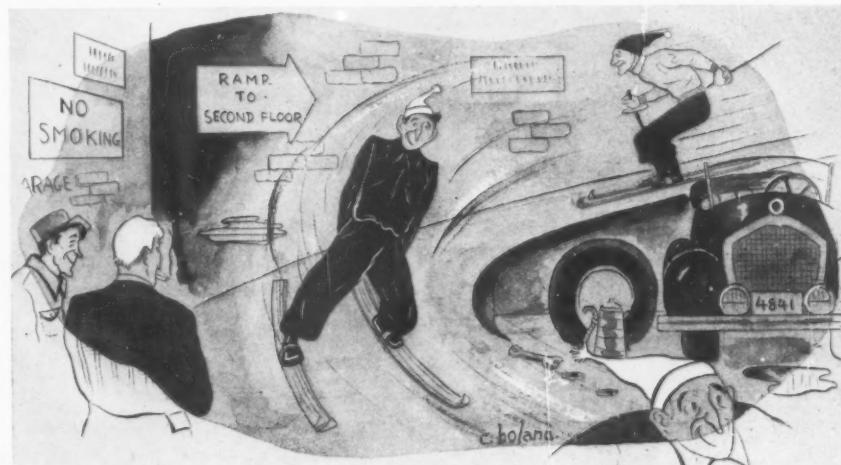
The St. Louis Tool Co., 2315-19 North Ninth St., St. Louis, Mo., has developed a new Superior Cylinder Boring Bar with several new features. It is equipped with a single cutter tipped with Tungsten Carbide, and revolves at high speed, insuring a glass-smooth finish. Accurate centering of the bar in any part of the cylinder is easily accomplished with four centering dogs in the boring head, expanding against the wall by



means of a knob located on top of the bar. The boring bar is locked in position by means of an exclusive hold-down clamp included with each bar. It has positive screw feed, and is equipped with a 1/4 hp., 110 volt, 60 cycle A.C. motor. The gears are of the silent type, inclosed in grease.

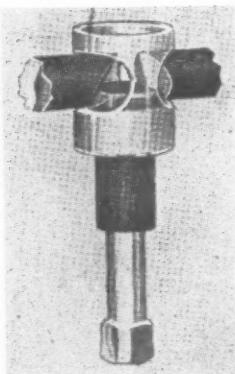
Correction

The heavy duty truck tire appearing in the photograph on page 31 of the June issue of Motor Age was incorrectly stated as being made by the Goodrich Tire & Rubber Co. Manufacturer of this tire is the Goodyear Tire & Rubber Co.



"We rent it out to a skiing club on dull days!"

New Equalizer for Ford Brakes



A new brake equalizer operating on the "free float" principle, and intended for installation on all Ford cars from 1928 to 1938, has been announced by Progressive Engineers, 23 St. George St., St. Louis, Mo. The manufacturer claims the "free float" principle prevents sticking and locking of brakes, and eliminates "fade out" at high speeds. The equalizers are said to be easily and quickly installed and adjust in the same manner as the original screw but permit much more accurate adjustment. Priced at \$3.50 per set of four, for passenger cars, and \$7.50 for trucks. An attractive introductory offer is available to jobbers. For complete information, write the manufacturer.

Free Ring Offer

Effective July 1 and continuing until August 31, the Wilkening Manufacturing Co. of Philadelphia, is offering through its distributors to give one set of the new Pedrick Steeloil piston rings free with the purchase of a set of Pedrick hydraulic piston rings for the same make and model vehicle.

Pedrick Steeloils are recommended by the maker as a "quick-cure" oil ring for badly worn jobs. Steeloils are multiple-piece or segment-type rings consisting of steel segments top and bottom with a cast-iron spacer between having jumbo slots for oil drainage. Behind the segments is a slotted expander which holds the pieces against the cylinder.

Pedrick hydraulic piston rings, with the purchase of which the Steeloils are offered free during July and August, have been on the market for eight years and are recommended by the maker as the rings for long-life,

all-around, top performance in any job.

Repairmen interested in taking advantage of this introductory offer of Pedrick should see the nearest Pedrick jobber or write direct to Wilkening Manufacturing Co., Paschall P. O., Philadelphia, Pa.

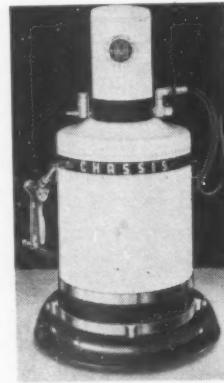
Louis Meyer Turns Engine Builder

Bowes Racing, Inc., has been formed in Indianapolis by Robert Bowes and Louis Meyer. Meyer is the only three-time winner of the annual 500-mile Indianapolis race. The company will manufacture engines for racing cars. Mr. Bowes is president and Mr. Meyer is general manager and secretary, with Al Jones as vice-president. Operations will begin as soon as a suitable plant can be located. Mr. Bowes, Indianapolis manufacturer, has backed racing cars entered in every Indianapolis race since 1930. He is a part owner of the Bowes Seal Fast Special, which ran in this year's classic.

New Lubricant Container By Aro Equipment

The Aro Equipment Corp., Bryan, Ohio, announces a new line of lubricators servicing direct from 25, 35 and 50 lb. containers. These lubricators, known as the "Junior" models, supplement the regular Aro line of cabinet lubricators designed for use with 100-400 lb. drums.

Included in the Aro "Junior" line are metered gear lube dispensers, waste oil drains, spring packers and power gun fillers, also a three-in-one combination unit consisting of one chassis lubricator and two metered gear lubricant dispensers mounted on a single portable base.



Catalogs, Manuals, Books, Merchandising Aids

The B. F. Goodrich Co. has just issued a new 135-page catalog containing a complete description of all the automotive accessories and tire repair materials which it manufactures or sells. Fan belt and radiator hose specifications for passenger cars, trucks and buses and tractors are given. Copies are available upon request.

The K-D Lamp Co., Cincinnati, Ohio, announces the release of their latest catalog No. 38. The catalog illustrates the many products in the famous K-D line, and contains information of assistance to all who sell or buy automotive safety lighting equipment. The I. C. C. charts which this company has been distributing for several years are included in the new catalog. Copies free upon request.

The National Assn. of Petroleum Retailers has published a new manual of service station merchandising and management, illustrating scores of merchandising ideas which have been developed and proved successful in the retail gasoline field. The manual is attractively bound and contains 240 pages with over 100 illustrations.

New developments in arc welding, rods, machines and technique are described in a new 340-page manual recently published by Hobart Brothers Co., Hobart Square, Troy, Ohio. The manual "Arc Welding and How to Use It" is priced at \$1.50 per copy in the United States and \$2 in Canada.

The machinist's manual, "How to Run a Lathe," in a new thirty-fourth edition, has just been announced by the publishers, the South Bend Lathe Works, South Bend, Ind.

The new edition has been revised and the material divided into chapters and sub-headings according to machining operations, beginning with the elementary work, and progressing to the more advanced metal working jobs.

Besides dealing with lathe work, the book also includes general shop information, such as reference tables and formulae, rules, gages, specifications, shop hints, etc.

Copies are 25c. each. Stamps or coin of any country are accepted. Copies are available by writing to MOTOR AGE or to the South Bend Lathe Works, South Bend, Ind.

An all-steel, visible binder stand complete with detailed instructions and information on the construction and maintenance of every type clutch in every model and make of car has been prepared by the Accurate Parts Manufacturing Co. For further information, see your jobber or write the Accurate Parts Manufacturing Co., 12435 Euclid Avenue, Cleveland, Ohio.

Information about servicing Ford V-8, Lincoln and Lincoln-Zephyr motor cars and trucks, as well as Ford Transit buses, is contained in a comprehensive 300-page service bulletin just sent to press by Ford Motor Co.

The new bulletin is a quick-reading encyclopedia of service information which will provide service managers and mechanics the data they need on service problems on vehicles produced from 1932 on.

It supersedes all previous Ford, Lincoln and Lincoln-Zephyr service bulletins, and will be kept up to date by the publication of separate new pages as rapidly as possible when new data becomes available.

There is no charge except for the cost of the binder. Independent garages may order from their parts distributors.

Complete information on modern methods of cleaning in automotive maintenance and engine repairing are outlined in a new 36-page booklet announced by Oakite Products, Inc., New York, N. Y., manufacturers of cleaning materials for automotive repair and service outlets.

Among the many operations on which full instructions, supplemented by illustrations, are given are washing chassis and bodies, washing motor interiors and exteriors, steam and tank cleaning motor repair parts, cleaning cooling systems and stripping paint.

This booklet may be obtained by writing to Oakite Products, Inc., 14 Thames Street, New York, N. Y.

A series of articles designed to give service men a practical working knowledge of the engineering problems connected with modern brakes is being published by American Brakebok, brake lining manufacturers, for the company's dealers.

Author of the series, entitled "Modern Brakes," is J. A. McLaine, a member of the American Brakebok engineering staff.

A discussion of the braking problem in terms of rate of travel and heat generated formed the subject of the first article. The second article, now being issued, describes types of modern brake lining and the manufacturing processes involved.

Other articles will present information about brake drums and the various types of brake systems now in use. Reprints of the first two articles will be mailed on written request to the American Brakebok offices, Detroit.

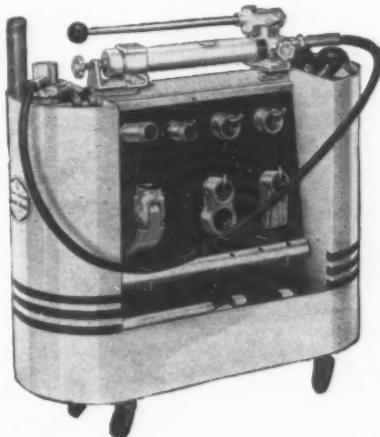
"The New Atlas Shaper" is the subject of Catalog 30 issued recently by Atlas Press Company, Kalamazoo, Michigan. Close-up views of the most frequent shaping operations are presented along with construction details and technical specifications. Copies are available from the company. The new Atlas has 7" stroke, standard bull-gear type drive powered by V-belts, four speeds, and five feeds in either direction.

Described as being bigger and better than ever before, Bonney Forge and Tool Works, Allentown, Pa., announces its new catalog No. 138.

Containing 88 pages and printed in the convenient 5 in. x 7 in. pocket size, this book describes the complete line of wrenches of every type, screw drivers, punches, chisels, pliers, hammers and body and fender repair tools.

Improvements Added To Porto-Power

Blackhawk Mfg. Co., Milwaukee, Wis., makers of Porto-Power, has announced several improvements to the latest model. Among the new features are: the ram plunger retracts automatically when release valve is opened; power increased from 7 tons up to 10 tons; swivel coupling joins



hose and pump, preventing kinks; new attachments for removing and inserting Ford shackle studs and perch bolts, and many other features of this push-pull hydraulic power unit make it an up-to-date piece of equipment for the shop. For complete information and prices, write the manufacturer.

Perfect Circle Adds New Packaged Sets

With the recent addition of 23 new Ferrox X-90 Packaged Sets, 735 models of cars and trucks, or over 90 per cent of the piston ring market, can now be serviced with Perfect Circle Ferrox X-90 Sets, according to an announcement by The Perfect Circle Co., Hagerstown, Ind. These new sets incorporate Ferrox Surface and "200" Top Rings, and are guaranteed to stop oil pumping in any engine that can be fixed with piston rings, the manufacturer states.

Fair Circuits Claim Big Car Drivers

Automobile racing's big car schedule gets into full swing in July with the circuit of county and state fairs claiming the spotlight. Late in the month the first of the speed events in conjunction with the fairs will get under way at Harrington, Del.

The Delaware State Fair, for years the inaugural event in the fair circuit, will present its speed program on July 30.

In August seven programs will be run at the fairs and in September the busiest month of the season will find the drivers in competition at nine fairs. October will see eight races at the fairs.

In addition to the crowded schedule, September will grab the spotlight of speed competition because of the year's only national championship classic outside of Indianapolis and the only title event on a dirt track this year. The championship classic, which will not alter Floyd Roberts', Indianapolis winner, place as champion for the year, will be a 100-mile event at Syracuse, N. Y., on September 10, in conjunction with the annual New York State Fair.

Following are the events scheduled in July and August:

July 4—Hohokus (N. J.) Speedway.

July 4—Lakewood (Atlanta, Ga.) Speedway.

July 10—Cook County (Chicago, Ill.) Fairgrounds.

July 17—Milwaukee (Wisc.) Fairgrounds.

July 23—Mineola (Long Island, N. Y.) Fairgrounds.

July 30—Harrington (Del.) Fair.

Aug. 6—Lewiston (Pa.) Fair.

Aug. 14—Cook County (Chicago) Fairgrounds.

Aug. 20—Middletown (N. Y.) Fair.

Aug. 20—Illinois State Fair, Springfield.

Aug. 21—Wisconsin State Fair, Milwaukee.

Aug. 25—Wisconsin State Fair, Milwaukee.

Aug. 27—Hamburg (N. Y.) Fair.

Aug. 28—Wisconsin State Fair, Milwaukee.



Pepper Martin, of baseball fame, standing beside the Cragar race car he owns. At the wheel is Pietro Alberti, who has campaigned the car over the major fair circuits.

Wake Up and Live

(Continued from page 16)

side where the successful repair shops really do a job. On this side they are aggressive, sure of themselves, hard working, honest and determined to make good regardless of what the mob do or think. That's the go-getter bunch of repairmen and you can move over on their side with just two changes. Change your thinking and change your tactics. You can follow this plan no matter who, where, or what you are. If you do—you're going to make money.

Advertising and merchandising are also big factors in the success of any

business, that is, consistent advertising. Don't come back at me with this one—"I've tried sending out folders, blotters, etc., and made many solicitations yet I never got a nickel's worth of business in return." Any good salesman will tell you that *consistency* is one of the most important factors in his work. He always makes his calls and they in turn grow into others. The same thing applies to merchandising and advertising—you must keep everlastingly at it. If you send out literature on a hit-and-miss basis, that is every once in a while, I'll tell you right now save your money; it must be consistent to get results.

You have read this far, now, just sit back and listen to this story.

I knew a fellow who had a small, puny gasoline station, which was actually out on its feet as far as business was concerned. The station, located at 5501 Harvard Avenue, Cleveland, was owned and operated by J. F. Seaman. The location was in a poor neighborhood where most of the people were factory workers—when they worked. With the depression dumped into his lap he had nothing he could call his own except a good cold in the head. At this period he was pumping about four thousand gallons a month plus five or six lubricating jobs and once in a blue moon a car wash. He could handle the gasoline all right, but the lubrication was performed while lying on his back and the car washing was of the back yard variety—just a sprinkling.

An automotive equipment salesman stepped into his life at this particular moment and through his efforts he got this fellow to believe not only in himself, but in his business. He woke up out of this slumber we are prone to go into and started to show symptoms of developing into a "go-getter." He saw the light of day and realized that lubrication was the one thing that would pull him out of the gutter. He was also smart enough to know that in order to get this lubrication business he must first get modern lubricating equipment.

So he bought himself the necessary equipment to install the Floating Body lubricating system. He went out and borrowed enough money to cover the initial down payment on the purchase of this equipment. There, me lads, is some of the courage and determination we were talking about, back a little ways in our story. Neither one of these virtues mingle or mix with self pity, alibis, fear or failure. From then on he really started to do things and the doing of these things made him healthy, wealthy, and wise. He sent our mailing cards, folders, tags, and kept eternally after them. He talked lubrication to every one who bought a gallon of gasoline or a quart of oil, never missing an opportunity to let them hear or see just what Floating Body Lubrication would do for their car.

Within 30 days the fellow actually started to get busy. Within 60 days he had to put a man on to handle the lubricating jobs. Well, to make a long story still shorter, within a year after he came "back alive" he had two men working besides himself and they were all kept busy. He had a complete lubrication set-up, plus a car washer, and quite a big assortment of accessories. The profits from his business built a complete new porcelain enamel station, got him out of debt entirely, and now he is pumping around 20,000 gals. of gas a month, plus 150 car washes and well over 150 lubricating jobs.

The foundation for that whole business was lubrication. Of course, he couldn't get the lubrication business without proper equipment and that equipment actually increased everything along the line—gas gallonage, lubrication, accessory sales, and car washing.

You can use this very same item as a feeder—lubrication. The average car is lubricated about six times a year. To be sure it's a small sale compared to a repair job but, it ac-

(Continued on page 40)

SAFETY LIGHTING

A Safety Factor THAT NEVER FAILS

SAFETY...

the big talking point today...

QUALITY...

the big talking point always...

BOTH are linked in every K-D Product designed, engineered and built to provide the maximum of safety through quality which leaves nothing undone to insure dependability.

AMAZINGLY simple, ruggedly constructed, challenges comparison. Lens visible day or night, fair or adverse weather. Finger-tip controlled semi-automatic switch. Six different types. Furnished complete for installation. APPROVED in most states, others pending.



Model
No. 565 B



Model
No. 565 D



Model
No. 565 A

NEW K-D CATALOG READY FOR YOU. SHALL WE SEND?

Members by Invitation
Rice Leaders of the World Association

THE K-D LAMP CO.
CINCINNATI, OHIO

For Every Purpose

U. S. Makes Quality Equipment
On Which You Can DEPEND



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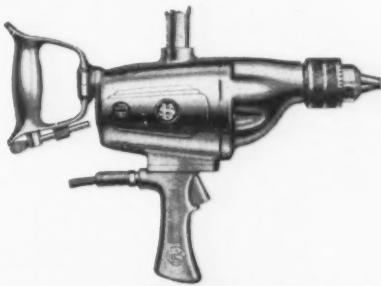


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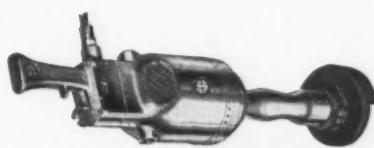


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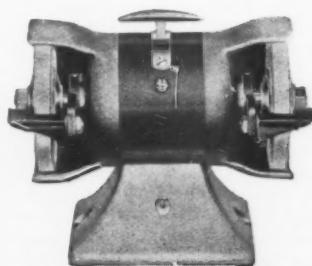
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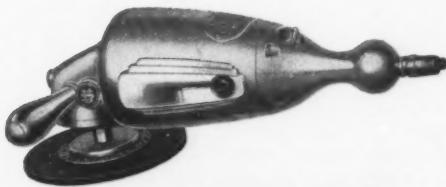
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"THE GOOD MECHANIC'S CHOICE"

OHIO, U.S.A.

Hudson Transmission

(Continued from page 11)

To disassemble main shaft drive and intermediate gears, remove the seven main shaft thrust balls and the 26 main shaft needle rollers 12. Place drive gear assembly in a vise and insert one jaw of the lock ring remover through the opening milled in the gear, gripping the retaining ring 19 and placing to opposite jaw just above the lock ring as shown in Fig. 5. Compress the lock ring remover and lift one side of the lock ring out of the groove, and then with a blunt punch, tap the other side of the lock ring and it will snap

out of place. Complete disassembling operation by taking gears apart and removing front and rear thrust washers 17 and 18.

Remove main drive gear ball bearing from gear using special puller as shown in Fig. 6. On 1934 and 1935 model Hudson transmissions, remove reverse gear assembly and stationary shaft by taking out the two reverse gear shaft cap screws 86 cap 85, shift rail strap pivot 92, Fig. 2, and drive the shaft 84 out of the case from the inside, using a long punch. This will permit lifting the rotating shaft 91 and gear assembly 88, 89 and 90 out of the case.

On Hudson models 1936, 1937 and 1938, remove reverse gear assembly

and stationary shaft by removing the two reverse gear shaft cap screws and withdrawing cap 37 and shaft 33. This will permit lifting the rotating shaft and gear assembly out of the case. The stationary gear and rotating shaft are pressed together and are serviced as an assembly only.

To remove countershaft, take out cap screws holding countershaft rear bearing 23 and cap 24 to transmission case. This will permit removal of the cap 24, thrust washer 26 and spacer 28.

Insert the beveled edge of a drift between countershaft drive gear 29 and the countershaft intermediate gear 30 and break the gears apart. After the countershaft has been forced back on the splines in the drive gear by this method, the shaft should be turned slightly so that the splines of the shaft butt against the splines of the drive gear.

Next insert a brass drift through the mainshaft bearing hole in the transmission case and drive countershaft intermediate gear forward, Fig. 7, taking care not to drive the gear completely off the shaft.

With the low and reverse shifter arm in reverse position, move the countershaft to one side to permit placing shifter arm in neutral position. Holding the three countershaft gears together, remove the countershaft through the rear of the transmission. Remove low and reverse intermediate lever stud 47 and take out lever 46.

Remove Allen set screw from right hand side of transmission case and drive low and reverse shifter fork shaft 51 out of case, using a blunt punch.

Remove cotter pin and castellated nut 44 from the bottom of transmission case permitting removal of the reverse gear shifter lever fulcrum 43, the reverse gear shifter pick up lever 41, reverse gear shifter lever, reverse gear shifter 38 and parts 40 and 42.

This completes the disassembly of the transmission. All parts should then be thoroughly washed and inspected and defective parts replaced.

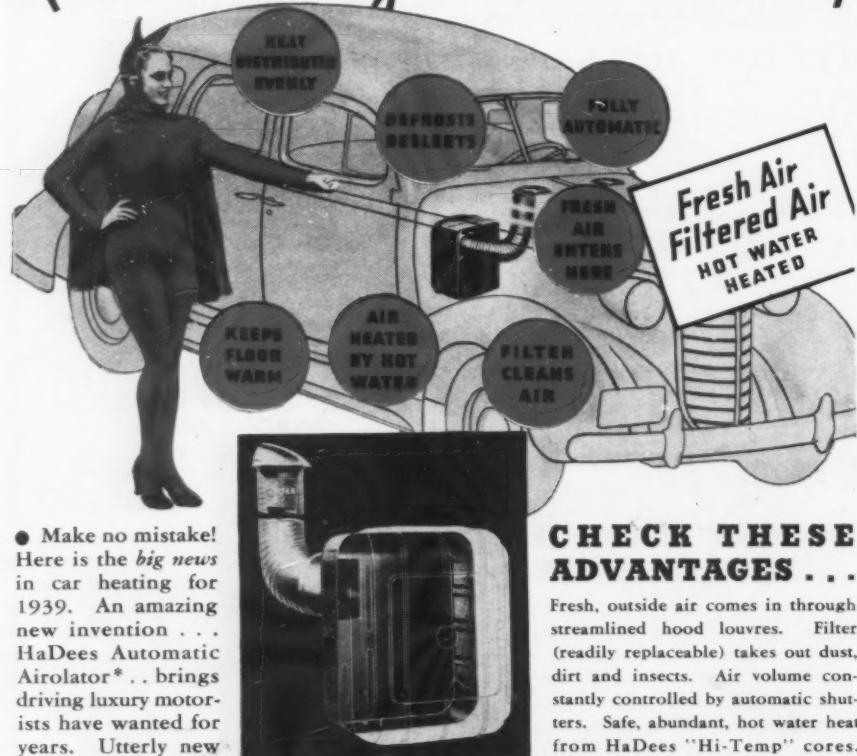
When reassembling, the first step is to place the reverse gear shifter lever and pick up lever 41 together in their proper positions with the plunger and plunger spring 42 in the shifter lever as shown and the locator pin 40 in the lower lever. The beveled ends of the plunger and locator pins must point to the bottom of the case. These parts as a group are then placed in the bottom of the case and assembled by inserting the fulcrum 43 through the levers and the case and assembled with the copper gasket under the fulcrum nut, 44.

Install reverse gear shifter 38 in lever. Install low and reverse shifter fork assembly 49, locking shaft securely with Allen set screw. Install low and reverse intermediate lever 46 and stud 47. Be sure to use copper gasket under stud nut.

Install countershaft thrust washer retainer 27 on countershaft. Assemble countershaft low and reverse gear 31 on countershaft. Install countershaft intermediate gear retainer 32 on countershaft. Install countershaft intermediate gear 30 on countershaft so that front end of gear will be flush

(Continued on page 38)

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Consecutive Victory
AT INDIANAPOLIS

FLOYD ROBERTS, driving his Champion-equipped Burd Piston Ring Special, won the 1938 Indianapolis 500-Mile Race at a record-breaking speed of 117.2 miles per hour. All 10 cars to finish used Champion Spark Plugs.



SELL THE SPARK PLUG CHAMPIONS USE

Hudson Transmission

(Continued from page 36)

with edge of countershaft splines. Install countershaft drive gear retainer 65 on countershaft. Place countershaft drive gear 29 on countershaft front thrust washer 25 in their correct positions over front end of countershaft. With low and reverse shifter lever in straight up or neutral position and the three countershaft gears held together, install assembly in case. Place shifter lever in reverse position and enter countershaft low and reverse gear 31 into low and reverse shifter 49. Align countershaft drive gear so that countershaft splines

are entered in the hub, then drive countershaft forward through the intermediate and drive gears until the counter bore in the intermediate gear hub is over the retaining ring 32.

Install spacer 26 on rear end of countershaft with the oil groove facing the rear. Place bronze thrust washer on front end of rear bushing cap. Install cap and thrust washer in position, placing a sufficient quantity of shims between the rear bearing and the case to keep the end play to .005 to .009 in. Draw the cap screws tight.

On 1934 and 1935 transmissions the sliding gear 88 should be installed on the rotating shaft with the shifting fork collar to the rear, while on 1936 and 1937 units, the sliding gear 36 is

installed with the collar to the front. Install reverse rotating shaft stationary gear assembly and gear 36 in case, entering the sliding gear collar on the reverse gear shifter 38. Install stationary shaft 84 in the 1934 and 1935 transmission, secure with dowel screw 92 and replace reverse gear shifter cap 85 with gasket and screws. The stationary shaft 33 on 1936, 1937 and 1938 transmissions is first secured in the cap 37 with a dowel pin, then installed in the case with cap gasket and fastened with cap screws.

Next install main drive gear ball bearing 8 on main drive gear 6, see Fig. 12. Install main shaft needle roller retaining ring. When assembling main drive gear and main shaft intermediate gear 16, place intermediate gear in a vise as for disassembling operation. When it is necessary to re-bush mainshaft intermediate gear, only a new gear assembly should be used.

Install mainshaft intermediate gear rear thrust washer 18 in gear 16. The thrust washer is of Bakelite. Install intermediate gear thrust washer retainer 19 on drive gear 6 ahead of bearing journal. Enter rear end of main drive gear into intermediate gear and install the front thrust washer 17 with the babbitt face downward. Center the retainer 19 so that the gap in the ring wall will be exactly one quarter turn away from the slots or openings in the intermediate gear. Then force the snap ring into the groove, Fig. 13.

Insert main drive gear assembly through opening in top of case. Install the thrust balls and the needle bearings 12, packing with cup grease to hold them in place. Install main shaft rear bearing 14 on main shaft about 1 in. from rear end. Insert main shaft through opening in rear of transmission case and install low and reverse gear and the second and high shift sleeve, with the shifter collar to the rear. Install the main shaft low and reverse gear retainer 20 in groove on main shaft, using cup grease to hold the parts in place. Holding the mainshaft firmly against the thrust balls, place bearing installing tool over main shaft rear bearing 14 and drive gearing in place. This will also drive the main shaft low and reverse gear forward to cover the retainer 20.

Install speedometer drive gear and housing. Install main drive gear bearing retainer 4, placing the necessary number of shims between retainer and case to provide .008 in. to .012 in. end play in the main shaft.

Next assemble shifting mechanism, taking care to use sufficient shims between the lock rod guides and transmission case to give a clearance of .005 in. between end of plungers 79 and lock rod links 78.

New Auto-Lite Field Men

The merchandising division of The Electric Auto-Lite Company of Toledo have added seven new field and district representatives to their spark plug field force.

G. S. Carpenter and Wm. L. Ellis will work in New York, R. L. Blackwood in Pennsylvania, C. P. Hoff in Nebraska, Thomas Harvey in Michigan, W. S. McClellan in Oklahoma, and J. F. Wulfert in California.



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MOTOR AGE, July, 1938

Rugged



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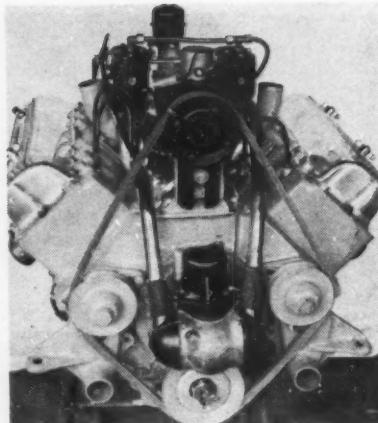
Wet or Dry Valve Resurfacers

The Van Dorn Electric Tool Co., Towson, Md., announces two complete new valve resurfacers. One operates on the Wet-Grinding principle, which increases the speed of grinding and produces a smooth, mirror-like surface on the valve face, and the other operates on the conventional dry-grinding principle. Features of each of these resurfacers are: 9/16 in. and 5/8 in. capacities, two universal motors, independently driving collet and wheel spindles; improved bearing construction; sensitive slides with three

point bearing suspension of feed tables and grinding spindles of improved ball bearing construction and double-ended to provide for stem grinding; work head adjustable for any angle from 0 deg. to 90 deg. Micrometer valve stem, rocker arm and breaker point grinding attachments are available for these resurfacers.

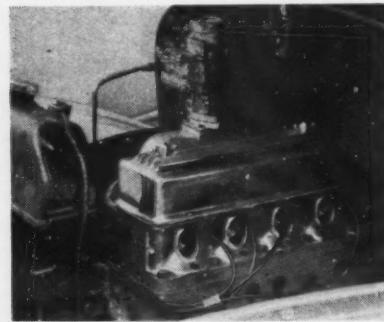
Racing Heads for Ford & Willys Cars

The Alexander Automotive Engineering Co., 345 West Manchester Avenue, Inglewood, Cal., has devel-



Ford V-8 engine with Alexander equipment

oped special cylinder heads for use on Ford V-8 engines and Willys engines. The Ford units are supplied with valve-in-head type with special valves and springs, special intake and exhaust manifolds, high-lift camshaft, two Winfield carburetors and special rings; this set gives developed horsepower of 138 at 4800 r.p.m. and uses 7.5 to 1 compression ratio. Other special features may be added, including special oil pumps and engine bearings, dual ignition and others, which will



Willys 77 engine with racing head by Alexander

make the engine develop 172 hp. at 5500 r.p.m. Illustration is of the engine completely equipped.

A similar unit is available for the Willys 77 engine to adapt it to midget racing, at a cost of \$92.50.

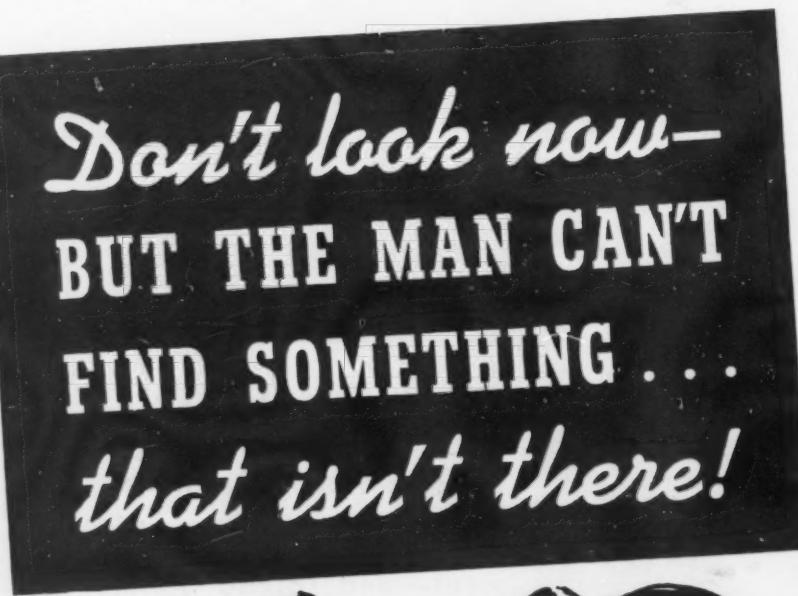
Wake Up and Live

(Continued from page 34)

tually is the acorn that grows into the big repair job. Just imagine a car coming into your shop six times a year for lubrication—which also means six times a year for inspection. Do you know of any other way you could induce a motorist to come into your shop that often?

Lubrication is a natural for repair work because it's the finest and easiest way to get acquainted with the motorist. And what an opportunity it provides to gain his confidence! It sells itself plus every other service and accessory handled in your shop.

Grab yourself by the boot tops, Mr. Repairman, and step from the minors to the big league by way of lubrication. It's the greatest salesman known to the automotive industry.



If you have a stock of bolts and nuts like this you know what it means to try to find what you want in a hurry. Often the size you want right now isn't to be found. And if it can be found, it's often rusted, too long or too short a bolt for the purpose. Save your time and temper! Install a LAMSON Treasure Chest and you've licked the problem. There are 118 sizes and kinds of fastenings, neatly packed in 15 drawers, all plainly labeled, and the entire stock comes to you in a strong steel cabinet that fits your shelf or counter. Prices \$9.95 to \$29.50—complete. Write us for more particulars—or ask your Jobber's salesman about it.

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Speed with Safety

(Continued from page 13)

35,000 candle-power for safe driving at 50. Actually they showed 15,000, which meant 30 miles per hour was about the safe speed I should be driving with the lights in that condition.

What was the answer? Bigger lamps? No. Polish the reflectors? No. What then? I was taken to a salesroom where had been rigged up a complete lighting system—battery, starting switch, ammeter, foot switch, light switch, wires and lamps. These demonstrating lights were turned on and their candle-power measured.

About 12,000. Not enough for safe driving these days. Alex took a "jumper" and connected directly from the battery to one of the lights. It flared up. He had cut out the switches, ammeter, etc. The light switch was hot as blazes. Yes, there was resistance there, resistance that robbed the light of battery current. Many cars are made with cheap switches I was told and service men have a great chance to install replacement switches of sturdier construction.

Before he was through with this test, he had connected up a relay and run short wires directly to each lamp. The increase in candle-power was pushed up from 15,000 to 29,000!

Alex lifted the hood of my car and

connected a jumper from the starting motor cable terminal to the headlights cutting out the old circuit. Much brighter lights was the result. This car, he said, had a lot of excess wire in the light circuit—true of many others. By installing a relay and running short wires to each lamp, the candle-power was brought up to the necessary requirements for 50-mile per hour driving. And strangely enough, in all this headlight service, nothing was done to the lamps themselves.

This does not mean that lamps must not be aimed, that reflectors need not be polished or bulbs replaced. But too often these things only are done with but very little increase in candle-power. After all, the battery, the battery cables, the switches, ammeter and all connections are part of the electric system. The lights are no better than the poorest connection or the point of greatest resistance. Service men should solder all connections where possible. Poor soldering done at the time the car is built often is responsible for poor lights. The tests for candle-power were easily made with a photo-electric cell apparatus. The mechanic as well as the car owner easily can read the meter to see how much light is available and whether this light is properly directed or aimed.

Headlight analysis must consider the primary function of the lights. The lights are there to illuminate the road ahead in order that the driver may see objects in time for safety. There must be maximum effective road illumination and good headlight service must contemplate the restoration of as much as possible of the illumination lost through the deteriorations or maladjustments that come from time to time.

"Let me tell you something about aiming lights. Fast night driving demands effective illumination of a small area far ahead," the old-timer went on and I culled the following:

For night driving at higher speeds "effective illumination" consists of that portion of the headlight beam concentrated on and just above the road some 500 feet or more ahead. Scientific tests conducted by the Illinois State Highway Department demonstrate that maximum range of visibility is achieved when the center or brightest part of the beam is aimed straight ahead, and level or slightly above.

In considering effective illumination for customary night road speeds (40 miles an hour and more) we are limited to that portion of the headlight beam which falls within an area about 3 degrees to 5 degrees wide and from 1 to 3 degrees high.

Adjustment of headlight aim and test's of effective candle-power must therefore be concerned primarily with this limited portion of the beam.

Various headlight manufacturers have adopted varying standards for their beam patterns. Some show a pattern that is wide and not very deep, like Fig. 1, while others will more nearly approximate a design such as in Fig. 2.

The dot in the center of each pattern represents the point of greatest intensity, the candle-power or brilliancy being less and less the farther

Summertime is family car time ---- with more repair jobs for YOU

"HALLOWELL" STEEL WORK BENCHES

installed in your shop will let you handle these jobs easier



Fig. 992

The "Hallowell" Semi - Portable type Bench is a real asset in any automobile repair shop. It provides a firm, smooth working surface that can easily be moved from one job to another and bring tools, vises, etc., right beside the work at hand. No more running from car to bench. Strong handles that swing out of the way make moving easy.



Fig. 732
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Fig.
1112

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we move outward from beam center, until we reach the outer edge which is not a sharply defined line, but a "fuzzy" area that cannot be accurately distinguished or located.

There are two methods in use for aiming the stationary beam of asymmetric headlights. One is to attempt to aim the headlight so the "top" of the beam is level, and the left "edge" of the beam is straight ahead—Fig. 3.

The fallacy of such a method becomes evident when the two patterns are superimposed. Fig. 4.

Note, that the wide beam is aimed too far to the right, while the round beam is aimed too low.

Mr. Alexander recommends aiming the sharply defined center of the beam, instead of the "fuzzy" edge, thus assuring maximum road illumination at the point of maximum need. Thus, the two headlights, when aimed with the apparatus used by him would have centers that coincide. Fig. 5 thus throwing the brightest light at the same point for both cars.

Engineers recommend that this center be $2\frac{1}{2}$ degrees to the right of straight ahead with 1 degree drop, a deflection that has proven sufficient to avoid dangerous glare to approaching drivers, and at the same time provide effective road illumination.

The movable beam is, of course, aimed straight ahead with the same drop (one degree). Thus aimed, the addition of passengers in the back seat will not raise the beam center above the road.

Two methods of testing the amount of illumination are in vogue. One method employs a photo-electric cell behind a small aperture placed ten feet from the headlight, and ascertains the volume (or candle-power) of the beam which enters that aperture. The other method is to place a funnel-shaped hood directly against the headlight, thus gathering as many of the light rays as possible regardless of their direction.

"Suppose," said Mr. Alexander, "you come to my shop and my mechanic ranges his electric eye in front of your headlights and says 'You have only 12,000 candle-power in your two headlights. When you drive faster than 25 miles an hour at night you've probably noticed it's hard to see things far enough ahead.' And then you think back one night last week when you overhauled a farm wagon and barely had time to swing around it, so you say 'sure, what can you do about it? Give 'er the works.'

"So you test the battery—and you show your customer its direct effect on his candle-power. After all, the battery is an integral part of the lighting system, same as the switches, fuse, wiring, bulbs and other parts."

We talked about brakes, the new requirements of brake service, with everyone in a hurry and wanting to go places at high speeds, steering, lubrication and motor tune-up. And, all of the services and profit items for speed but which will also induce safety.

In steering, for example, the old-timer mentioned that it's amazing how many cars are running around with unbalanced front wheels. And, it's so easy these days with the special equipment designed for the purpose, to show the car owner the condition of the front wheels.

And, in the matter of brakes, this old-timer said he liked to talk about "timing" the brakes rather than about brake adjustments.

Certainly the motoring public is not going to be slowed down in its desire to see America and cover America, if it can help it. Certainly we're not going to design cars to be slower—once the public has had its taste of speed, good maneuverability and fast driving with safety.

But supposing the law makers step in after they have looked over the record sheets of accidents and decide they are going to reduce speeds all over the country. Do you know what effect that would have on the service dollar? The accompanying chart

(Fig. 6) tells the story quite clearly.

As I left him, the old-timer asked, "Why do you suppose it is that so many of the boys still overlook the profits to be made on brakes, lights, steering, lubrication, engine tune-up, cooling and such things?"

And, as I drove away, I, too, wondered.

Defiance Diversifies Manufacturing

Defiance Spark Plug Corp., Toledo, Ohio, has diversified its manufacturing.

The Defiance Corp. is manufacturing special brand spark plugs in chrome, cadmium, or conventional finish, with one or two ground electrodes.

BILL GETS A BREAK

BY PORTER



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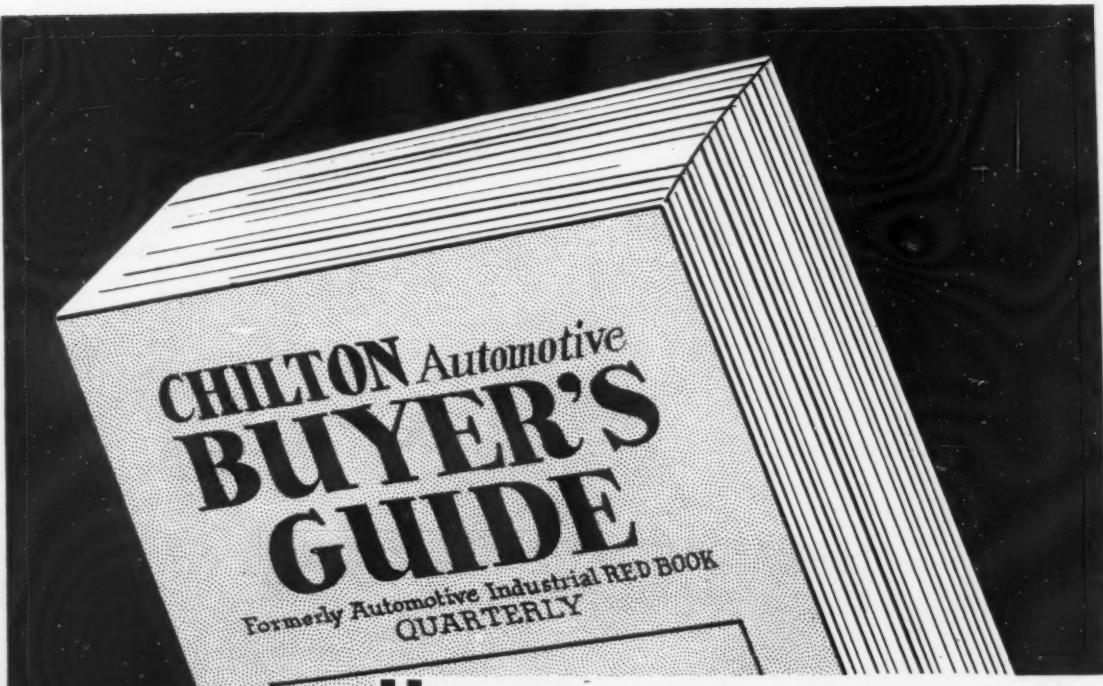
plete set of 54 J-M Safety Charts with brake adjustments for all popular cars—the best sales tool yet, brake men say, for ringing up profits in the cash register.

Get all the facts about this money-making proposition. Write Johns-Manville, 22 East 40th St., New York City. No obligation.



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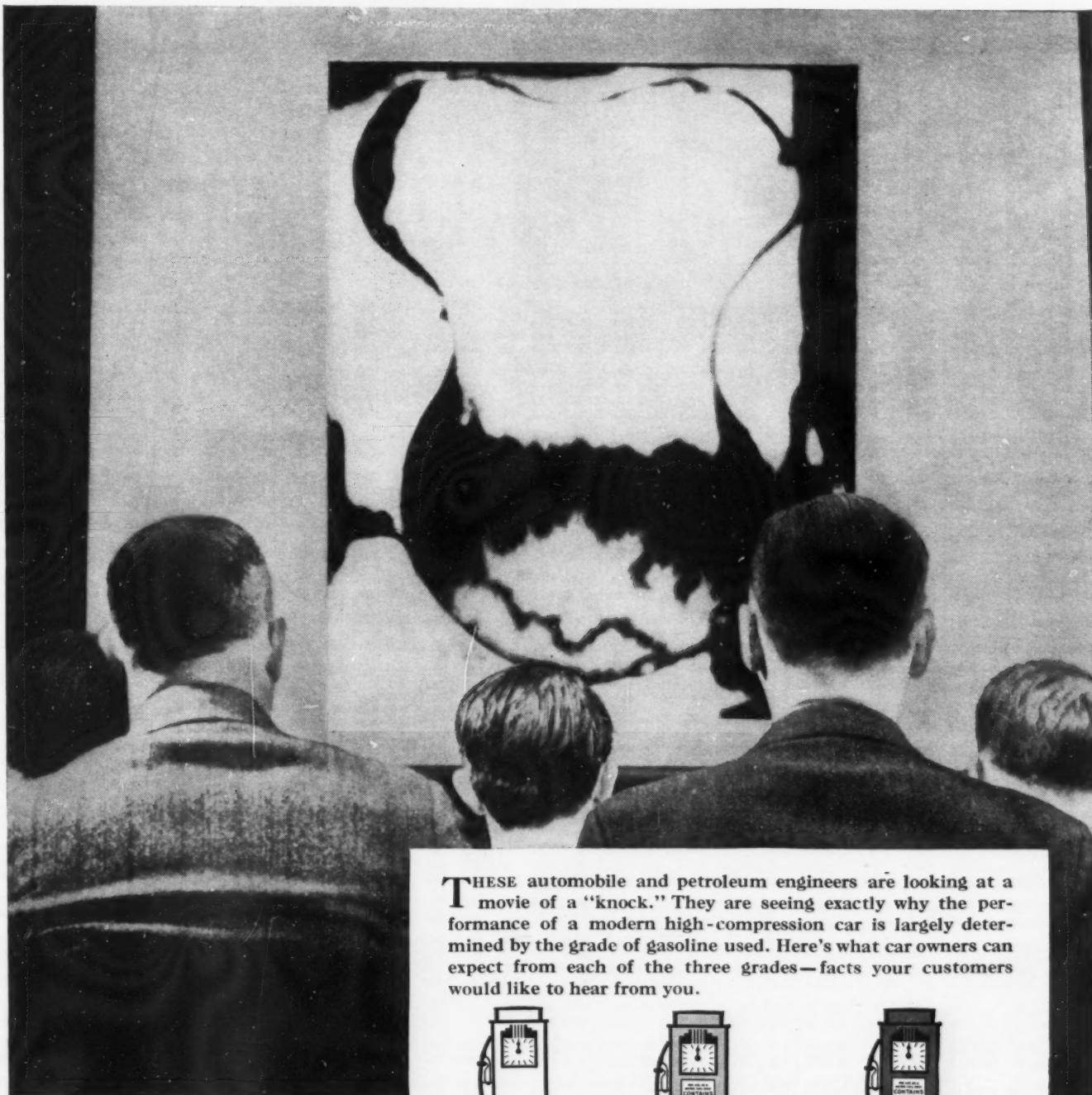
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THESE automobile and petroleum engineers are looking at a movie of a "knock." They are seeing exactly why the performance of a modern high-compression car is largely determined by the grade of gasoline used. Here's what car owners can expect from each of the three grades—facts your customers would like to hear from you.



Poor performance
with "low grade"
gasoline

There is no anti-knock fluid (containing tetraethyl lead) in "low grade" gasoline. Power is lost because the spark must be retarded to prevent "knock" or "ping."



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with "regular"
gasoline

Most regular gasoline has in it anti-knock fluid (containing tetraethyl lead). The spark can be considerably advanced for more power without "knock" or "ping."



Best performance
with gasoline
containing "ETHYL"

Gasoline "with ETHYL" is highest in all-round quality. It has enough anti-knock fluid (containing tetraethyl lead) so that the spark can be fully advanced for maximum power and economy without "knock" or "ping."

THROUGH A QUARTZ CYLINDER HEAD a special motion picture camera can now take "slow motion" movies of the actual combustion of gasoline. The picture you see here shows the start of a "knock." Note the spontaneous combustion of the fuel mixture *on the side of the combustion chamber away from the spark plug* (the lower part of the picture). Movies like this are regularly shown at the Ethyl Motor Clinic—be sure to see it when it comes to your vicinity.

ETHYL GASOLINE CORPORATION, manufacturer of anti-knock fluids used by oil companies to improve gasoline

MOTOR AGE, July, 1938

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Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Div'd.)	Wheelbase (In.)	Tire Size (In.)	No. of Cylinders, Bore and Stroke	Taxable H.P.	Piston Displacement (Cu. In.)	Maximum Brake H.P. at Specified R.P.M.	Compression Ratio (to-1.)	Displacement Factor $\frac{1}{2}$	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	CHASSIS							
																				Clutch	Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension	
1	Bantam	60	439	75	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	7.00	...	AI	Gear	Ais	No	AC	SM	Wal	DR	Del	P.Long	Own	m-Spi	1/2 Own	4.40	IC	
2	Buick	38-40	1022	122	6.50/16	8-3 1/2x4 1/2	30.6	248.0	107-3400	6.15	39.2	CI	LB	Ais	No	AC	SM	Wal	DR	Del	P.B&B	Own	m-Spi	1/2 Own	3.90	IC	
3	Buick	38-60	1272	126	7.00/15	8-3 1/2x4 1/2	37.8	320.2	141-3600	6.25	42.3	CI	LB	Ais	No	AC	SM	Wal	DR	Del	P.B&B	Own	m-Spi	1/2 Own	4.18	IC	
4	Buick	38-80	1645	133	7.00/16	8-3 1/2x4 1/2	37.8	320.2	141-3600	6.25	39.3	CI	LB	Ais	No	AC	SM	Wal	DR	Del	P.B&B	Own	m-Spi	1/2 Own	4.55	IC	
5	Buick	38-90	2176	140	7.50/16	8-3 1/2x4 1/2	37.8	320.2	141-3600	6.25	38.6	CI	LB	Ais	No	AC	SM	Wal	DR	Del	P.B&B	Own	m-Spi	1/2 Own	4.31	IC	
6	Cadillac	V8-38-60-60S	2085	127	7.00/16	8-3 1/2x4 1/2	39.2	346.0	135-3400	6.25	...	CI	Mor	Ais	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	3.92	IC	
7	Cadillac	V8-38-65	2285	132	7.50/16	8-3 1/2x4 1/2	39.2	346.0	135-3400	6.25	42.8	CI	Mor	Ais	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	4.58	IC	
8	Cadillac	V8-38-75	3075	141	7.50/16	8-3 1/2x4 1/2	39.2	346.0	140-3400	6.70	39.7	CI	Mor	Ais	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	4.58	IC	
9	Cadillac	V-16-38-90	5135	141	7.50/16	16-3 1/2x3 1/2	57.6	431.0	185-3600	6.80	...	CI	Mor	Ais	Fram	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	4.31	IC	
10	Chevrolet	HB Master	730	112 1/2	6.00/16	6-3 1/2x3 1/2	29.4	216.5	85-3200	6.25	35.7	CI	Own	CI	No	AC	Car	Own	DR	D	P.own	Own	m-Own	1/2 Own	3.72	C	
11	Chevrolet	HA Del.	796	112 1/2	6.00/16	6-3 1/2x3 1/2	29.4	216.5	85-3200	6.25	39.7	CI	Own	CI	No	AC	Car	Own	DR	D	P.own	Own	m-Own	1/2 Own	4.22	IC	
12	Chrysler	Roy. C-18	998	119	6.25/16	6-3 1/2x4 1/2	27.3	241.5	95-3600	6.20	39.3	CI	Mor	Ais	Pur	BA	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10	IC	
13	Chrysler	Imp. C-19	1198	125	6.50/16	8-3 1/2x4 1/2	33.8	298.6	110-3400	6.20	39.5	CI	M-W	Ais	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	1/2 Own	3.91	IC	
14	Chrysler	Cus. Im. C-20	2295	144	7.50/16	8-3 1/2x4 1/2	33.8	323.5	130-3400	6.50	...	AI	M-W	Ais	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	1/2 Own	4.55	IC	
15	De Soto	S-5	958	119	6.00/16	8-3 1/2x4 1/2	27.3	228.1	93-3600	6.50	37.8	CI	Mor	Ais	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10	IC	
16	Dodge	Six	898	115	6.00/16	8-3 1/2x4 1/2	25.3	217.8	87-3600	6.50	38.0	CI	Mor	Ais	Pur	AC	Str	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10	IC	
17	Ford	V8-60	685	112	5.50/16	8-2.8x3.2	21.6	136.0	60-4200	6.60	30.0	AI	Gear	CS	No	Yes	Str	Own	O	Own	P....	Own	m-Spi	1/2 Own	4.44	Tr	
18	Ford	V8-85	710	112	6.00/16	8-3 1/2x3 1/2	30.0	221.0	85-3800	6.12	37.5	AI	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	1/2 Own	3.78	Tr	
19	Graham	Std. Spec.	1025	120	6.00/16	6-3 1/2x4 1/2	25.3	217.8	90-3600	6.70	35.3	AI	LB	Ais	No	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	1/2 Own	4.27	C	
20	Graham	S.C., Cus. S.C.	1198	120	(h)	8-3 1/2x4 1/2	25.3	217.8	116-4000	6.70	...	AI	LB	Ais	Fram	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	1/2 Own	4.27	C	
21	Hudson	112	89	755	112	5.50/16	8-3x4 1/2	21.6	175.0	83-4000	6.50	...	CI	GED	AI	No	Bur	Car	Old	AL	Nat	P.own	Own	Nb-Spi	1/2 Own	4.11	C
22	Hudson	Terrapl.	81	884	117	6.00/16	8-3x5	21.6	212.0	96-3900	6.25	38.0	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.own	Own	Nb-Spi	1/2 Own	4.11	C
23	Hudson	Terrapl.	82	915	117	6.00/16	8-3x5	21.6	212.0	101-4000	6.25	37.5	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.own	Own	Nb-Spi	1/2 Own	4.11	C
24	Hudson	6	83	984	122	6.00/16	8-3x5	21.6	212.0	101-4000	6.25	36.7	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.own	Own	Nb-Spi	1/2 Own	4.11	C
25	Hudson	8	84	1060	122, 129	6.50/16	8-3x4 1/2	28.8	254.5	122-4200	6.25	41.2	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.own	Own	Nb-Spi	1/2 Own	4.11	C
26	Hupmobile	Six	1045	122	6.25/16	6-3 1/2x4 1/2	29.4	243.5	101-3600	5.75	42.2	CI	Mor	Ais	No	AC	Car	Old	AL	Wil	P.B&B	WG	Nb-Spi	1/2 Own	4.54	C	
27	Hupmobile	Eight	1325	125	6.50/16	8-3 1/2x4 1/2	32.5	303.2	120-3500	5.80	44.5	CI	Mor	Ais	No	AC	Car	Old	AL	Wil	P.Long	WG	Nb-UP	1/2 Own	4.54	C	
28	La Salle	V8, 38-50	1385	124	7.00/16	8-3 1/2x4 1/2	36.4	322.0	125-3400	6.25	40.7	CI	Mor	Ais	No	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	3.92	IC	
29	Lincoln	V12	138-145	125	7.50/17	12-3 1/2x4 1/2	46.8	414.0	150-3400	6.38	34.3	AI	Ch	AI	Pur	AC	Str	Own	AL	Exi	P.Long	Own	m-Spi	FF Tim	4.58	C	
30	Lincoln	Zephyr	13751	125	7.00/16	12-2 1/2x3 1/2	36.3	267.0	110-3900	6.70	40.8	AI	Gear	CS	Fram	...	CG	Own	O	Own	m-Spi	1/4 Own	4.44	Tr			
31	Nash	Lafay.	3810	117	6.00/16	6-3 1/2x4 1/2	27.3	234.8	95-3400	5.83	38.4	CI	Whit	Ais	No	AC	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.11	C	
32	Nash	Amb. 8, 1603, 4.5	1050	121	6.25/16	6-3 1/2x4 1/2	27.3	234.8	105-3400	6.00	35.5	CI	Whit	Ais	BS	AC	Mar	Wal	AL	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.11	C	
33	Nash	Amb. 8, 1880	1200	125	7.00/16	8-3 1/2x4 1/2	31.2	260.8	115-3400	6.00	35.0	CI	Whit	Ais	BS	Bur	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.10	C	
34	Oldsmobile	F-38	967	117	6.50/16	8-3 1/2x4 1/2	28.4	229.7	95-3400	6.10	38.4	CI	Whit	Ais	No	AC	Car	Var	DR	D	P.B&B	Own	Nb-Mec	1/2 Own	4.37	IC	
35	Oldsmobile	L-38	1078	124	7.00/16	8-3 1/2x4 1/2	33.8	257.1	110-3600	6.20	41.7	CI	LB	Ais	No	AC	Car	Var	DR	D	P.B&B	Own	Nb-Mec	1/2 Own	4.37	IC	
36	Packard	Six	1175	122	6.50/16	8-3 1/2x4 1/2	29.4	245.3	100-3600	6.52	40.0	CI	Mor	Ais	Pur	AC	CG	Old	DR	Wil	P.Long	Own	Nb-Mec	1/2 Own	4.54	IC	
37	Packard	Eight	1601, 2	127, 48	7.00/16	8-3 1/2x4 1/2	33.8	282.0	120-3800	6.60	41.4	AI	Mor	Ais	Pur	AC	Str	Old	AL	PD	P.Long	Own	Nb-UP	1/2 Own	4.69	IC	
38	Pack.	Sup. 8, 1603, 4.5	2790	127-34-39	7.50/16	8-3 1/2x4 1/2	32.5	320.0	130-3200	6.50	40.0	AI	Mor	Ais	Pur	AC	Str	Old	AL	PD	P.Long	Own	Nb-Spi	1/2 Own	4.41	IC	
39	Pack.	Twelve	1607, 8	4155	134, 39	8.25/16	12-3 1/2x4 1/2	56.7	473.0	175-3200	6.40	45.3	AI	Mor	Ais	Pur	AC	Str	Old	AL	PD	P.Long	Own	Nb-Spi	1/2 Own	4.41	IC
40	Plymouth	P6	730	112	5.50/16	6-3 1/2x4 1/2	23.4	201.3	82-3600	6.70	36.6	CI	Mor	Ais	No	BA	BC	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	3.90	C	
41	Plymouth	P6	803	112	6.00/16	6-3 1/2x4 1/2	23.4	201.3	82-3600	6.70	38.2	CI	Mor	Ais	Pur	BA	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10	C	
42	Pontiac	6	38-26DA	916	117	6.00/16	6-3 1/2x4	28.3	222.7	85-3520	6.20	37.4	CI	Mor	CHI	No	AC	Car	BH	DR	Del	P.own	Own	Nb-Mec	1/2 Own	4.37	IC
43	Pontiac	6	38-28DA	980	122	6.50/16	8-3 1/2x4 1/2	33.8	248.9	100-3700	6.20	40.0	CI	Mor	CHI	No	AC	Car	Bu	DR	Del	P.own	Own	Nb-Mec</			

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug	RINGS		VALVES						IGNITION						FRONT AXLE														
				No. and Width Comp.	No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in			Head Diameter and Seat Angle	Operating Tappet Clearance	Intake Valve Opens Before or After T.C.	Inlet Tappet Clearance for Valve Timing	Inlet No. of Degrees	Exhaust No. of Degrees	Inlet No. of Flywheel Teeth	Breaker Points Gap (Ins.)	Timing	Spark Occurs 'TC'	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Renewed From	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	Caster (Degrees)	Camber (Degrees)	Toe-in (Inches)	King Pin Inclination (Degrees)			
							Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)																							
OM La	90	AL-A9	2-1/2	1-1/2	2-1/2	R	1-1/2	30	1-1/2	.279	.006	.006	.006	.19B	4-1/4B	.022	.025	2-1/2B	1B	Au	A	1-1/2	1-1/2	1-1/2	7	5	3/4	0° 9'	13/4	1		
OH S	112	AC-46	2(c)	2-1/2	1-1/2	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	13B	5-1/4B	.015	.025	4B	11-1/2B	Au	A	2	1-21/2	6	13-1/4	N-1/2	-1/2	31-1/2	2		
OH S	114	AC-46	2(c)	2-1/2	1-1/2	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2-1/2B	Au	A	2	1-21/2	6	13-1/4	N-1/2	-1/2	31-1/2	3		
OH S	114	AC-46	2(c)	2-1/2	1-1/2	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2-1/2B	Au	A	2	1-21/2	6	13-1/4	N-1/2	-1/2	4-1/2	4		
OH S	114	AC-46	2(c)	2-1/2	1-1/2	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2-1/2B	Au	A	2	1-21/2	6	13-1/4	N-1/2	-1/2	4-1/2	5		
BH S	155	AC-45	2-1/2	2-1/2	2-1/2	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2-1/2B	Au	A	2	2-1/2	2-1/2	2-1/2	7-1/2	5-1/2	5° 44'	6		
BH S	155	AC-45	2-1/2	2-1/2	2-1/2	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2-1/2B	Au	A	2	2-1/2	2-1/2	2-1/2	7-1/2	5-1/2	5° 31'	7		
BH S	170	AC-45	2-1/2	2-1/2	2-1/2	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2-1/2B	Au	A	2	2-1/2	2-1/2	2-1/2	7-1/2	5-1/2	5° 31'	8		
BH S	180	AC-45	2(c)	1-1/2	2-1/2	R	1.50	45	1.37	45	.341	AA	AA	AA	BB	3-1/2B	.015	.027	6B	2-1/2B	Au	A	2	1-21/2	1-21/2	1-21/2	11-30	0-1/2	5° 31'	9		
OH O	...	AC-46	2-1/2	1-1/2	1-1/2	.865	R	1-1/2	30	1-1/2	.340	.006H	.013H	.006	9B	3-1/2B	.021	.040	5B	2B	Au	A	2	1-1/2	1-1/2	1-1/2	13-1/2	1-1/2	7-10'	10		
OH O	...	AC-46	2-1/2	1-1/2	1-1/2	.865	R	1-1/2	30	1-1/2	.340	.006H	.013H	.006	9B	3-1/2B	.021	.040	5B	2B	Au	A	2	1-1/2	1-1/2	1-1/2	13-1/2	1-1/2	7-10'	11		
LH G	145y	AL-A7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.340	.008H	.010H	.014	8B	3-1/2B	.020	.025	TC	TC	Au	A	2	1-1/2	1-1/2	1-1/2	5-20	1-2	4-1/2	12		
LH G	145y	AL-A7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.340	.008H	.010H	.014	8B	3-1/2B	.018	.025	3B	1-1/2B	Au	A	2	1-1/2	1-1/2	1-1/2	6-20	1-2	4-1/2	13		
LH G	155y	AL-AL7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.340	.008H	.010H	.014	8B	3-1/2B	.018	.025	TC	TC	Au	A	2	1-1/2	1-1/2	1-1/2	6-20	1-2	4-1/2	14		
LH G	145y	AL-A7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.340	.008H	.010H	.014	8B	3-1/2B	.020	.025	TC	TC	Au	A	2	1-1/2	1-1/2	1-1/2	5-20	1-2	4-1/2	15		
LH O	140y	AL-A7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.340	.008H	.008H	.011	6A	2-1/2A	.020	.025	4A	1-1/2A	Au	A	2	1-1/2	1-1/2	1-1/2	5-15	1-2	4-1/2	16		
OM O	150y	Ch-H-10	2-1/2	1-1/2	1-1/2	.687	F	1.28	45	1.28	45	.279	.013C	.013C	.013	91/2B015	.025	4B	1-1/2B	Au	A	2	1-1/2	1-1/2	1-1/2	4-15	1-2	8	17	
OM O	100	Ch-7	2-1/2	1-1/2	1-1/2	.750	F	1-1/2	45	1-1/2	45	.310	.013C	.013C	.013	91/2B	3B	.015	.025	4B	1-1/2B	Au	A	2	1-1/2	1-1/2	1-1/2	5-22	1-2	8	18	
OH R	160y	Ch-J-9	2-1/2	1-1/2	1-1/2	R	1-1/2	30	1-1/2	45	††	.010H	.010H	.012	4-1/2B	1-1/2B	.018	.025	TC	TC	Au	A	2	1-1/2	1-1/2	1-1/2	5-15	1-2	7-1/2	19		
OH R	120	Ch-J-9	2-1/2	1-1/2	1-1/2	R	1-1/2	30	1-1/2	45	††	.010H	.010H	.012	4-1/2B	1-1/2B	.018	.025	4A	1-1/2A	Au	A	2	1-1/2	1-1/2	1-1/2	5-15	1-2	7-1/2	20		
HMG	115	Ch-J-8-A	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.341	.008H	.008H	.010	103/2B	4B	.020	.032	TC	TC	Au	A	1	1-1/2	1-1/2	1-1/2	4-12	1-2	7-1/2	21		
HMG	120	Ch-J-8-A	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.341	.008H	.008H	.010	103/2B	4B	.020	.032	TC	TC	Au	A	1	1-1/2	1-1/2	1-1/2	4-12	1-2	7-1/2	22		
HMG	120	Ch-J-8-A	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.341	.008H	.008H	.010	103/2B	4B	.020	.032	TC	TC	Au	A	1	1-1/2	1-1/2	1-1/2	4-12	1-2	7-1/2	23		
HMG	120	Ch-J-8-A	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.341	.008H	.008H	.010	103/2B	4B	.020	.032	TC	TC	Au	A	1	1-1/2	1-1/2	1-1/2	4-12	1-2	7-1/2	24		
HMG	118	Ch-J-8-A	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.341	.008H	.008H	.010	103/2B	4B	.017	.032	TC	TC	Au	A	1	1-1/2	1-1/2	1-1/2	4-12	1-2	7-1/2	25		
H G	107	Ch-7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.341	.010	.013	.013	1A	2B	.022	.027	7B	2-1/2B	Au	A	2	1-1/2	1-1/2	1-1/2	4-15	1-2	8-1/2	26		
H G	113	Ch-7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.341	.006	.013	.010	1A	2B	.015	.027	7B	2B	Au	B	2	1-1/2	1-1/2	1-1/2	4-15	1-2	8-1/2	27		
BH S	155y	AC-45	2-1/2	2-1/2	2-1/2	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2-1/2B	Au	A	2	2-1/2	2-1/2	2-1/2	7-25	N-3/4	0-1-1	5-1/2	28	
OM O	105	Ch-7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	††	AA	AA	AA	AA	AA	21B	6-1/2B	...	21B	Au	B	2	2-1/2	2-1/2	2-1/2	12-32	1-2	7-1/2	29		
OM O	105	Ch-H-10	2-1/2	1-1/2	1-1/2	F	1.54	45	1.54	45	.311	AA	AA	AA	AA	AA	19-1/2B	6B	.015	.029	4B	1-1/2B	Au	A	2	2-1/2	2-1/2	2-1/2	5-30	1-2	7-1/2	30
BH G	110	AL-B7	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.340	.015	.015	.015	15B	4B	.020	.025	4A	1-1/2B	Au	A	2	1-1/2	1-1/2	1-1/2	4-12	1-2	7-1/2	31		
BH G	125	AC-45	2-1/2	2-1/2	2-1/2	F	1-1/2	45	1-1/2	45	.372	.008H	.008H	.008	15B	4B	.020	.025	4B	1-1/2B	Au	A	2	1-1/2	1-1/2	1-1/2	4-12	1-2	7-1/2	32		
BH G	125	AC-45	2-1/2	1-1/2	1-1/2	F	1-1/2	45	1-1/2	45	.375	.015H	.015H	.015	15B	4B	.020	.025	9B	2-1/2B	Au	B	2	1-1/2	1-1/2	1-1/2	12-18	1-2	7-1/2	33		
BH S	146x	AC-45	2-1/2	2-1/2	2-1/2	P	1-1/2	30	1-1/2	45	.341	.008H	.008H	.011H	(k)	5B	2B	.020	.040	TC	TC	Au	A	2	2-1/2	2-1/2	2-1/2	6-17	1-2	4-1/2	34	
BH S	152x	AC-45	2-1/2	2-1/2	2-1/2	P	1-1/2	30	1-1/2	45	.341	.008H	.008H	.0																		

Motor Car Price, Weight and Body Table

Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford and Lincoln. Optional equipment, state or local taxes, transportation charges and finance charges are extra.

• 5 Wheel Equipment

†—6 Wheel Equipment

Truck Tune-Up Specifications

—At 1000 RPM

Bottom

Con-Continental

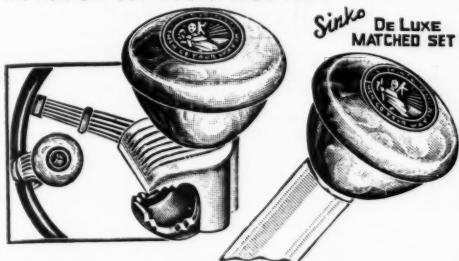
1

Wau—Waukeha

MOTOR AGE, July, 1938

NEW Sinko DeLuxe EMBLEMIZED DE LUXE SPIN-UR-WHEEL and GEAR SHIFT BALL

Your customers will like the new Medallion inserts of the Shrine, Knights of Columbus, Masons and St. Christopher in bronze. Harmonizing streamlined design and new colors: red, onyx, green, yellow, gray, beige, brown.



The new "Rim-Mounting" DeLuxe Spin-Ur-Wheel, with its new bronze insert, makes a perfect mounting on all modern steering wheels.

The "Rim-Mounting" Spin-Ur-Wheel, fitting all types of steering wheels, clamps to the wheel, without band to deface the outer rim.

The method of attaching is simple, no dismantling is necessary. Just loosen the screw at the base, align wheels, mount and tighten securely.

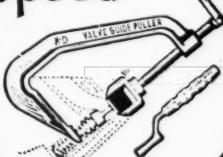
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SINKO TOOL & MFG. CO.

351 N. Crawford Ave., Chicago, U. S. A.

Speed



IN PULLING FROZEN FORD GUIDES

is assured by these specially designed C-shape screw type VALVE GUIDE PULLER SETS. Pressure is exerted directly on the guides and the pull is straight up. No danger of damage to any part, no matter how tight the guides are frozen.

920 Set for Ford 85 HP and Lincoln-Zephyr List \$10.00
860 Set for Ford 60 HP List 9.50

Ask your Jobber for Dealers' Net Prices

K-D MFG. CO. • LANCASTER, PA.

A
COMPLETE
CHEMICAL
LINE

Flare

MAKES MORE
MONEY FOR
YOU!

FLARE products are immediately identified by their brilliantly attractive, identical labels.

The satisfactory performance of any FLARE product serves as a recommendation for the entire FLARE line.

Your customers have only to try FLARE to know that when you sold this exceptional product to them you had their best interests at heart.

For greater profits from a larger list of customers sell FLARE.



HYDRAULIC BRAKE
FLUID

Made of the highest grade vegetable oils and other ingredients, perfected and proven under exhaustive laboratory and road tests, this fluid has been winning acclaim from thousands of satisfied users.



FLARE FLASHOIL

A and B
with colloidal graphite
To use in "top-cylinder" oilers or to mix with gasoline for motor break-in, for added cylinder lubrication, for easier starting. An item that sells fast and repeats often.

FLARE (formerly Flash) LABORATORIES 1858 W. Kinzie St.
Chicago, Illinois

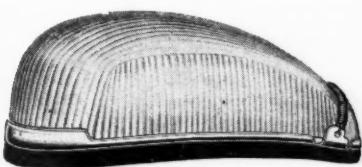
MOTOR AGE

—is a publication keyed directly to the needs of the maintenance field. Built on the requirements of the serviceman. Edited by Bill Toboldt. Read it every month.

A Chilton Publication

CHESTNUT AND 56TH STS.
PHILADELPHIA, PA.

You'll
Want to Sell
the
Zephyr
CLEARANCE
lamp



ATTRACTIVE—Modern design makes this new lamp ideal for use as fender lamp—or as a clearance or 3-in-line light on trucks. ECONOMICAL—Gives 50% more light—uses 50% less current. Equipped with 1½ cp bulb.

EFFICIENT—More protection—less time to change bulbs. Rugged—easy to install. Fits curved or flat bodies.

Ask your jobber or write
DO-RAY LAMP COMPANY
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Flares (Electric and Oil) • Tiger-Ey and Knobby Reflex Devices • Foglites • Stop and Tail Lamps and Specialties

SACHS MOTOR
2.3 H.P.

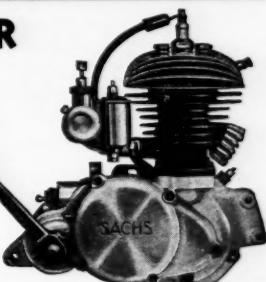
Precision Engineered
Power Plant for
LIGHT WEIGHT
VEHICLES

Utility and Pleasure Applications

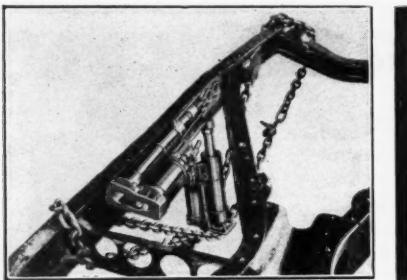
- 29 lbs. net weight.
- Compact and Powerful.
- Rugged 2-Speed Transmission built in.
- Smooth cork-insert multiple plate clutch.
- 15 Watt fly-wheel magneto for ignition and lighting.

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Correspondent Office for the United States and Canada
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**POWER PLUS
MAKES SHORT WORK OF
DROPPED FRAMES**

Perfection POWER PLUS Hydraulic Jack makes short work of frames which have dropped at point where X joins channel by laying in channel and extending frame to original position.

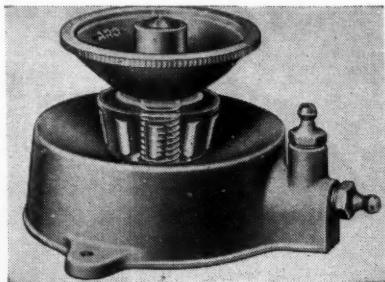
You'll find Perfection POWER PLUS hydraulic units make short work of all body aligning, frame work, fender straightening, rear axle housing, bumper straightening, knee action adjustment, steel running boards.

The only double-acting PUSH-PULL hydraulic jack, Perfection POWER PLUS gives you Speed, Power, Dependability, Accessibility, Adaptability throughout.

**G. A. C. MANUFACTURING CO.
ASHLAND, OHIO**

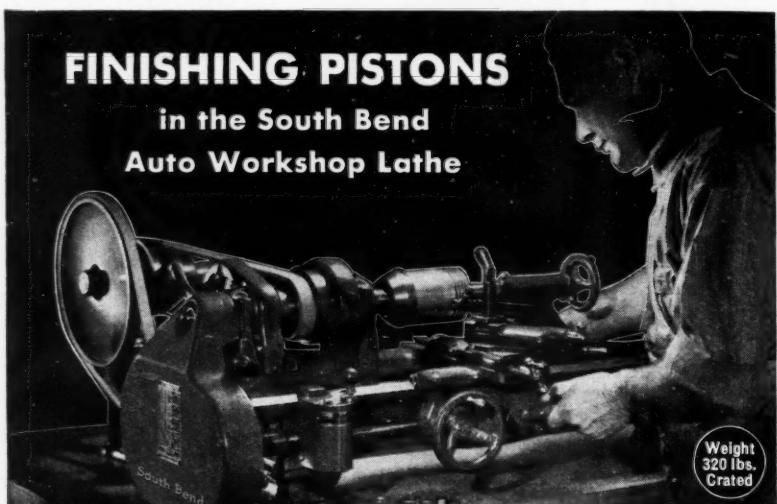
**Repacks Front Wheel
Bearings**

To meet the demand for a simple, efficient method for packing front wheel bearings, The Aro Equipment Corp., Byran, Ohio, has announced their new Model 116 wheel bearing packer. This compact unit is designed for lubricating either ball or roller type bearings, and can be used with any grease gun equipped with Hi-Draulic coupler. The bearing is placed in the wheel bearing packer as shown in the illustration. Grease is applied through either of the two ball head fittings, and is forced in and around rollers or balls from the inside.



**Raybestos Assortment
Serves "All Three"**

The Raybestos Division of Raybestos-Manhattan, Inc., Railroad Ave., Bridgeport, Conn., has announced three assorted sets of Raybestos Silver Edge brake lining for Ford, Chevrolet and Plymouth cars, combining price appeal with quality. These sets employ a single type of molded material which has been developed to give uniformly satisfactory performance and long wear. The lining is drilled and countersunk, ready for installation on the brake shoes. Six assorted sets are supplied with the three-color counter display illustrated.



**FINISHING PISTONS
in the South Bend
Auto Workshop Lathe**

No. 415-YA 9 1/4" x 3' Workshop Lathe with Adjustable Horizontal Counter-shaft, 1/4 H.P. Reversing Motor, \$11700

Finish pistons—reface valves—cut screw threads—make bushings—bore re-babbited connecting rods—true commutators and undercut mica—these, and hundreds of other automotive and general machine operations can be done quickly and accurately on the 9-inch Auto Workshop back-gearied, screw cutting precision lathe with a few attachments. This lathe is an all-purpose tool capable of handling 95% of the service jobs coming into the modern motor repair shop. Get the extra profits by doing all this work on the auto workshop lathe.

Use the coupon—Get the new auto service bulletin No. 33-G with full-page illustrations showing these jobs. Write for details on our liberal easy payment purchase plan.

**68 Sizes and Types of Lathes
for every purpose**

9" lathe prices start at \$85
11" lathe prices start at \$371
13" lathe prices start at \$448
15" lathe prices start at \$544
16" lathe prices start at \$642

\$85.00

Less Motor Drive
Terms as Low as
\$6.00
a Month

**South Bend
Lathe Works**

591 East Madison St.,
South Bend, Indiana, U.S.A.
Send the following booklets Free, postpaid

How to Finish Pistons
 9" Auto Workshop Lathe Bulletin
 Easy Payment Plan.

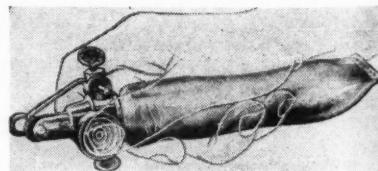
Size of lathe interested in
Name
Address
City State

SOUTH BEND

Precision LATHES

**Striper Set Uses
Collapsible Tube**

A striping tool designed to use paint put up in collapsible tubes has been introduced by Wendell Mfg. Co., 2535 N. Ashland Ave., Chicago, Ill. It consists of the striping head and guide, and is supplied with any one of 11 stripe width wheels. The collapsible tube holding the paint material is attached to the striping head and is squeezed out as required. Price complete, \$2.50.



WHIZ Products

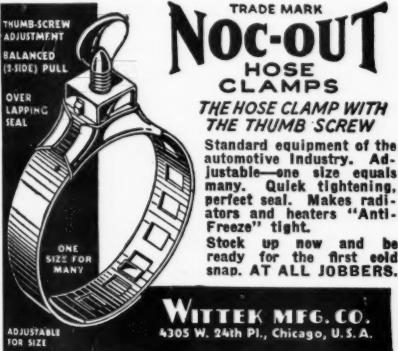
The WHIZ "Easy Liquid Way to Car Beauty" eliminates two-thirds of the time and labor of a wax job, according to the R. M. Hollingshead Corp., of Camden, N. J. It is sold as the No. 70 Golden Anniversary Special and consists of a 16-oz. can of Liquid Pre-Wax Cleaner and a 16-oz. can of Liquid Wax. The wax is guaranteed by the manufacturer to be free from abrasive. It is packed in a combination package retailing at a special price of 98 cents. A colorful display card, a window banner and 12 Car Beauty folders are packed in each case of 12 packages.

YOU NEED THIS LINE
LINKERT
PERFECT ENGINEERED PARTS
FOR
CARBURETOR
REPLACEMENTS



CORRECT ASSORTMENTS
FOR
CHEVROLET
AND
PLYMOUTH

LANGSENKAMP-LINKERT CARBURETOR CO.
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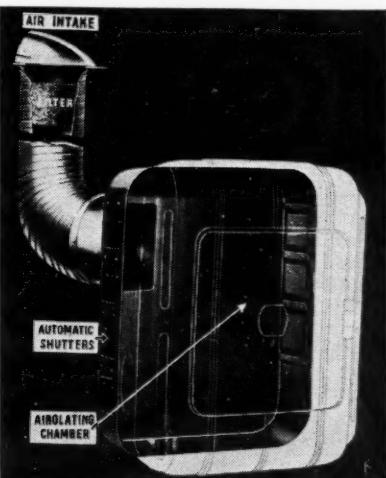
MOTOR AGE, July, 1938

Hadees Features

Airolator Heater

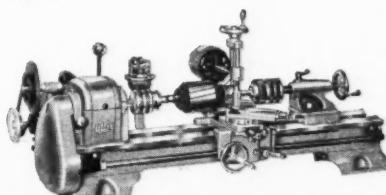
Liberty Foundries Co., Rockford, Ill., has announced an improved line of automobile heaters, and a strictly new invention known as the Hadees Automatic Airolator. The Hadees Airolator is claimed to provide car owners with fresh outside air, filtered, hot-water heated and automatically tempered and mixed with recirculated car air to exact degree desired. The Airolator draws air from the outside by means of attractive, streamlined hood or side louvres, filters it, and forces it into the Airolating chamber equipped with automatic shutters. These shutters automatically control the mixing of outside and inside air, and direct it through the heater core. In mild weather the heater fan is not needed, circulation being supplied by the motion of the car. For summer driving the water valve may be closed and the Airolator will provide cool outside air filtered free from dust, dirt and insects.

Hadees heaters are supplied in 9 models ranging from \$9.95 to \$22.95. Hadees Airolators list from \$7.95 to \$8.95, and defroster fittings at \$3.95. A Hadees "Fresh air tempering unit" will be marketed for application to the lower priced and previous models, and will retail at \$3.95.



New Lathe For
Armature Work

A new Atlas 618 backgeared screw-cutting lathe with 6-in. swing and 18-in. centers has been developed by the Atlas Press Co., Kalamazoo, Mich., and is designed especially for armature work. All equipment for trueing, under-cutting and polishing is furnished with the new outfit. Lathe, under-cutting attachment, chucks, tools and motor are included in the price of \$104.50. Optional outfits may be purchased without motor or under-cutter.



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These Quality
DURO CHROME
TOOLS *

EQUIP YOU
TO DO A BETTER
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An ideal, well balanced combination assortment of all essential tools to completely equip the mechanic. Tools suitable for finest work on ignition systems, generators, radios, to general automobile, airplane, truck and tractor repair work.

Made of chrome vanadium steel. Tops in quality—perfection in design, and a Big Value for your money.

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Gardiner
30/70 BODY SOLDER

NOW AVAILABLE
IN
1/2 POUND
BARS

Now the superior alloy that has made Gardiner meter bar, regular bar and $\frac{1}{4}$ -inch round body solders outstanding favorites with leading car makers, body builders and discriminating shops is available in $\frac{1}{2}$ -Pound Bars. Due to modern production methods they are priced lower than even ordinary solder. Your jobber can supply the new $\frac{1}{2}$ -Pound Bars of Gardiner 30/70 promptly . . . also wire and flux-filled Solders and Babbitts.



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DeVilbiss

Spray-Painting Equipment—Spray Booths—Canopy Exhaust Systems—Exhaust Fans—Air Compressors—Hose and Hose Connections—Oil Guns.

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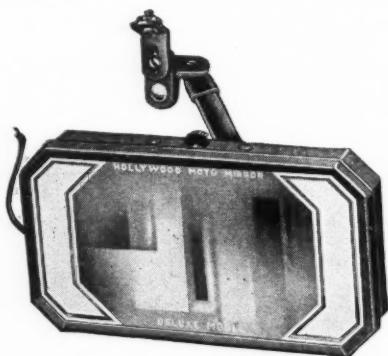


THE HERBRAND CORPORATION
FREMONT, OHIO

**Make-up Mirror
For Glove Compartment**

A new product, known as the Hollywood Moto-Mirror, has been introduced by the American Automatic Devices Co., Harrison, Throop & Congress Sts., Chicago, Ill. It is a make-up mirror with a swing bracket, and mounts in the roof of the glove compartment, so that it occupies very little space and yet swings out in position where it is convenient to use. Twin electric light bulbs in the container project powerful diffused rays of light for evening make-up or for reading road maps. When not in use it lies flat against the top of the glove compartment. Women will recognize that this device is something they have longed for, and men will appreciate the fact that their rear vision mirror will not be used for make-up.

Each unit is packed in a handsome display box, and carries a list price of \$1.95.



Holds Drop Center Wheels

A drop center wheel holder, illustrated, has been developed by The Ken-Tool Mfg. Co., Akron, Ohio. It is made in two styles, with the crank at the top or at the side, to provide for mounting on a wall or post. Turning the crank raises the upper hook to the desired position according to the size of the wheel. The hook can be raised slightly to permit rotating the wheel, which greatly simplifies the operation of changing the tire or cleaning and inspecting the wheel. A tool tray for holding necessary tools is also supplied. Net price (handle at top), \$9.00; with handle at side, \$12.50.



Swim Season

With the hot weather comes summer fiction, mosquitoes, and such mental diversions as jig-saw and crossword puzzles. This year the vogue seems to be towards quizzes. Friends are greeted, not by "Hello," but by "Can you tell me this . . . ?"

One of the catch questions now going the rounds is "Can a man swim in gasoline?" Not that anyone would want to swim in gasoline, but that medium seems as good as any for the

**BALDOR
CAPACITOR TYPE**

GRINDERS

WRITE FOR BULLETIN
on Complete Line. Sturdy
built for long, hard
grinding. Extra overload
capacity. Thousands used
in auto repair shops. 4
HP: 6" x
5/8" wheels. \$19.50
Wt. 39 1/2
lbs.

2-YEAR GUARANTEE
Against Burn-out
BALDOR ELECTRIC CO.
(Electrical Mfrs. for 18 years)
4375 Duncan Ave., St. Louis, Mo.

10

Minutes

... in your own shop . . .
to TURN and UNDER-
CUT a COMMUTATOR
with the new 2-IN-1.

SMART TOOL

FIRST and ONLY LOW-PRICED Unit for
Servicing Armatures! Superior to a Lathe!

Ask Your Jobber.

SMART TOOLS, INC. Dept. A
FALL RIVER, MASSACHUSETTS

HEXSET SCREW PLATE NO. 77

All Dies 1" Hex Outside. Can be used
with wrench in close quarters. Tap Wrench
with $\frac{3}{8}$ " squared opening at top for
use with ratchet or extension handles.

Set complete—
11 T p s, 11
Dies, 5/16" to
1/2" S.A.E. and
U. S. S.; 1/8"
Pipe, 9" Die
Stock; Tap
Wrench.

**DEALER NET
PRICE \$8.50**

Rinck-McIlwaine, Inc. New York



HOOK ON

Repair Muffler
Blow-outs
in 15 Minutes

Heavy gauge, asbestos lined, 13
in. "HOOK-ON" Muffler Shoe
slips completely around rusted or
blown-out section. Fit 4", 5",
and 6" round muffler with
over-lap. Beaded ends and formed
clamps give perfect seal. Low
cost, big profit.

For Fords we recommend patented No. 49 (one-
all) Repair Jacket, covers complete muffler (tele-
scopes to length, laps around). Looks like new
muffler. Your jobber or direct.
6 No. 50 Universal Shoes \$3.60 (net dealer cost).
6 No. 49 Ford Over-All Jackets \$5.40 (net dealer
cost). Shipped postpaid if check accompanies order.

SPRING SPECIALTY CO.
7 N. 8th Ave., Maywood, Ill.

U.S.
PAT. NO.
2,107,588

current mental gymnastics. When the question was put to the American Petroleum Institute, its experts went into a huddle and answered, "No."

In water the human body, with lungs inflated, is lighter than the liquid medium. Gasoline, however, is about one-fifth lighter than water, and in it a person is far less buoyant. To keep afloat would require tremendous effort, comparable to that needed by an airplane, which is heavier than air, to keep in flight.

ACCURACY for the asking

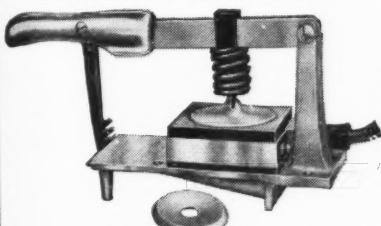


Get the right answer the first time with the Lanoke Motor Analyzer—accurate to 1%. Offers precision testing on battery voltage, voltage losses in line, voltage regulators, generator output, distributor breaker mechanism, distributor cap and rotor, high tension wires, spark plugs, valves, rings, starting motors, coils, condensers. A real asset for your shop. Write for details.

Lanagan & Hoke, Inc., 1638 Hunting Park Ave.
Philadelphia, Pa.

LANOKE

MODEL C TUBE PLATE



Practical for all tube repairs, and especially adapted for attaching rubber valve stems to tubes. The only one of its kind the Patent Office has allowed patents on, patent No. 2009549 and 2086866. Costs to operate less than $\frac{1}{2}$ ¢ per hour. Fully guaranteed. Chase Mfg. Co., 3216 Delmar Blvd., St. Louis, Mo.

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40,000,000 MOTORISTS:
EVEREADY PRESTONE
TRADE-MARKS
ANTI-FREEZE
Costs More by the Gallon...
LESS by the Winter
WILL YOU CASH IN?

Pin Hole Honing is Cheaper and Better than Reaming



Spray Guns

(Continued from page 21)

and progress of the company through 50 years, the management is still in the hands of the DeVilbiss family. The present president, Allen DeVilbiss Gutchess, a grandson of the original founder succeeded to the office vacated at the death of Tom DeVilbiss in 1928. Tom's son, Howard, is assistant secretary and treasurer.

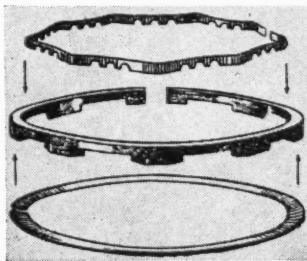
A visitor in the plant cannot help

but be impressed by the friendly and cordial relations between the workers and the executives. The DeVilbiss Employees' Association was formed in 1916 by the employees to furnish financial aid to members during sickness or disability. A death benefit is made possible through the income from funds provided by the company and the late president.

Lion Auto Parts Distributes New Piston Ring

A new and improved piston ring known as the Hi-Co piston ring, made by the Wesco Piston Ring Co., is receiving national distribution through the Lion Auto Parts & Mfg. Co., Inc., 1920 South Michigan Ave., Chicago, Ill.

This new ring consists of three pieces including a thin steel side expanding segment, a flexible cast iron ring, and a Swedish steel inner ring. The side expander is slightly dished to compensate for worn ring grooves and to eliminate blow-by. The oil ring has extremely wide channels, allowing surplus drainage, and is said to correct oil pumping troubles. The entire assembly is claimed to be able to compensate for out of round cylinders and worn ring grooves and to provide increased power for the engine by increasing compression.



Inspections

(Continued from page 29)

tax, inasmuch as its manifest purpose is simply to meet the expenses of issuance. * * *

"The issuance of a license by the state is not intended to confer an unconditional privilege to operate a motor upon any highway at any time the owner may fancy. * * * Municipalities have the special power to regulate the use of the streets.

"An automobile may be operated only by one having a driver's license. The legislature has likewise provided that the law is violated if an automobile is mechanically defective in certain respects. In order to be assured that the laws pertaining to mechanical equipment are observed, the legislature is not limited in the exercise of its police powers to the punishment of infractions of the law, but has the right to require periodical inspections of vehicles. * * *

"The state, for example, has the right not only to license a barber, but may enforce its sanitary rules as to his shop by a periodical inspection. So in this case the state may license a motor vehicle and at the same time require the vehicle to be in mechanical condition. This can be done only by an inspection law.

"The state has the right, in the exercise of its police power, to legislate against defective automobiles on the highway as well as defective drivers. To do so it may require, as a condition to the effective use of a license, that there be periodical inspections. The state not having legislated, and the municipality having acted, such action is not in conflict with any statutory or constitutional provision."

**Tune up Your Sales
with
THE ENGELHARD
Exhaustalyser**



Your cash register will ring up the dollars more often when motor "tune-up" is done the Engelhard way. Exhaust gas analysis is the answer to your spring "tune-up" campaign. It makes it easy for you and your customer.

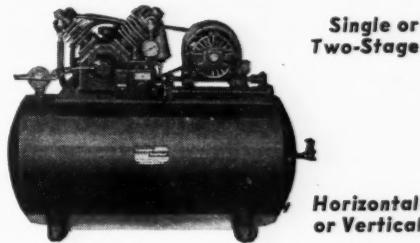
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CHARLES ENGELHARD, Inc.

90 Chestnut St., Newark, N. J.

Manufacturers of Pyrometers, Resistance Thermometers, Combustion Indicators, Exhaust Gas Analyzers, Fluor Gas Analyzers, Thermocouples.

WILMINGTON COMPRESSORS



Have Everything

• More Wilmington Compressors are being sold this year than ever before . . . because the word has passed around that in Wilmington you get the year's outstanding value. New designs, new features, greater efficiency; all at prices you want to pay.

• Before buying a Compressor, get our 1938 Catalog. See for yourself the exceptional construction Wilmington offers in a complete range of sizes and styles.

THE AUTO COMPRESSOR CO.
N. Mulberry St. Wilmington, Ohio

A PRACTICAL MEASURING WRENCH of superior and permanent accuracy

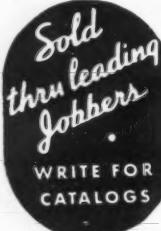
\$9.75



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COMPACT — DURABLE
NO ADJUSTMENTS

MINIATURE TRAIN & RAILROAD CO., Glen Ellyn, Ill.
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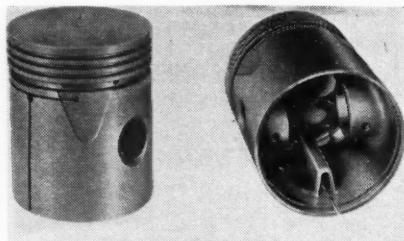


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New Aluminum Alloy Piston

A new aluminum alloy piston with a "V-bridge" structure, cast integral with the skirt of the piston, has just been announced by Aluminum Industries, Inc., Cincinnati, Ohio, producers of Permitte Products. The "V" structure bridges the gap in the vertical slot on the minor thrust face, and is said to control expansion and contraction and prevent skirt collapse.



PERMITTE *Permaloy* PISTON

The full skirt, it is said, contacts the cylinder over a large area, and is not subject to localized high bearing pressures. The design allows slot construction without excessive skirt flexing, which unseats rings, decreases oil mileage and causes blow-by. In addition, the "V-bridge" structure also assists in heat transfer, for in joining both sides of the skirt the flow of heat becomes uninterrupted.



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